



The Foreign Comparative Testing Program

Review of Fiscal Years 2003-2004



August 2005

Comparative Testing Office
Deputy Under Secretary of Defense
(Advanced Systems and Concepts)
www.acq.osd.mil/cto

FOREWORD

I am enthusiastic about the accomplishments of the Foreign Comparative Testing (FCT) Program and am pleased to sponsor this “*FCT Review of Fiscal Years 2003-2004.*”

The FCT Program has been authorized by Congress since 1980 and is a key acquisition tool for the U.S. Department of Defense. FCT enables DoD to put the world’s best equipment in the hands of our operational forces, while strengthening defense relationships through international armaments cooperation. Resulting procurements of \$7 billion in U.S. procurements clearly demonstrate both the U.S. commitment to the “two-way street” in defense procurement and the willingness of our allies and coalition partners to share their technology and compete in the U.S. defense market.

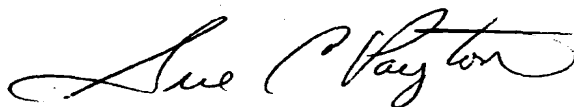
The success of the FCT Program is predicated upon the value that world-class equipment brings to the warfighter, as well as the dedicated work by test teams in evaluating the equipment and ensuring its safe, effective integration into the operational inventory. Many equipments and technologies qualified and procured as a result of FCT are deployed with U.S. Forces engaged in the global war on terrorism in Afghanistan and Iraq. Examples include the U.S. Special Operations Command’s AT-4 Confined Space (Anti-Armor) Weapon; the Army’s “Buffalo” Mine-Protected Clearance Vehicle; advanced 25K Air Cargo Loaders with Air Force airlift units; and new semi-automatic Joint Service Combat Shotguns with 1st Marine Expeditionary Forces. Other FCT successes provide critical mission capabilities for chemical/biological agent detection, protection, and decontamination; chaff/flare electronic countermeasures protection for combat aircraft; increased individual firepower; deployable satellite data receiving and processing for mission planning; and intrusion detection.

Notable accomplishments during Fiscal Years (FYs) 2003 and 2004:

- Forty-seven projects completed test and evaluation. The equipment in 26 of these meets Service or U.S. Special Operations Command requirements. Twenty first-time procurements valued at \$183 million were realized in FYs 2003 and 2004, with some procurements resulting from projects completed in prior years. Additional follow-on procurements from previous successes totals over \$560 million.

- Two acquisition awards presented by the National Defense Industrial Association (NDIA): the “2003 *Contractor Tester of the Year*” recognizes the Air Force’s Air Armaments Center test program coordinator for the successful Emergency Aircraft Arresting System and Retractable Arresting Cable FCT projects; and the “2004 *NDIA Civilian Tester of the Year*” honors the U.S. Special Operations Command-Army Research Laboratory project manager for the very productive Gunfire Detection System project.

The FCT Program has an excellent track record of support to the U.S. warfighter over its twenty-five year history; its contribution is evident today in our fight against terrorism. I am proud of these accomplishments and look forward to continuing successes.

A handwritten signature in black ink, reading "Sue Hayton". The signature is fluid and cursive, with the first name "Sue" and last name "Hayton" clearly distinguishable.

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OVERVIEW OF THE FOREIGN COMPARATIVE TESTING (FCT) PROGRAM

The Foreign Comparative Testing (FCT) Program¹ supports the warfighter by leveraging mature equipment and technologies from allied and coalition partner nations to satisfy U.S. defense requirements, thereby accelerating the U.S. acquisition process and lowering development costs. The Deputy Under Secretary of Defense (Advanced Systems and Concepts) administers the FCT Program within the Office of the Under Secretary of Defense (Acquisition, Technology and Logistics).

Compared to similar U.S. development programs, the FCT Program reduces by an average of 5½ years the acquisition cycle time for fielding world-class systems and equipment. Many FCT projects have also reduced total ownership costs of military systems, cutting overall acquisition and support expenditures while enhancing standardization and interoperability, improving allied cross-service support, and promoting international cooperation.

Each year the Military Services and U.S. Special Operations Command nominate candidate projects to the Office of the Secretary of the Defense (OSD) for funding consideration. The proposals are evaluated to ensure that: (1) the item(s) proposed for evaluation addresses valid DoD requirements; (2) a thorough market survey is conducted to identify all potential candidates; and (3) the sponsoring organization has developed a viable acquisition strategy to transition the item to the U.S. warfighter, demonstrating solid intent and wherewithal to procure the technology or equipment if it meets requirements and provides best value.

OSD evaluates, selects, and prioritizes the candidate proposals and notifies Congress of its intent to fund the new and continuing projects in the coming year. The sponsoring organizations obtain the items for evaluation, conduct the test program, and procure those that meet their requirements. Approved projects are normally funded for one or two years.

The *Comparative Testing Office Handbook*² contains further details on the program and describes how successfully to manage an FCT project, from the initial proposal phase through procurement.

¹ The FCT Program is authorized by Title 10, United States Code, Section 2350a(g). Further guidance is found in the DoD FAR Supplement which addresses the acquisition and distribution of commercial and non-developmental items.

² For additional information concerning this report or to obtain a copy of the Handbook, contact the Director, Comparative Testing Office (CTO) by e-mail (Robert.Mattes@osd.mil), see the CTO Home Page at <http://www.acq.osd.mil/cto/>, or write to OSD(AT&L)/AS&C/CTO, 3700 Defense Pentagon, Room 3E144, Pentagon, Washington, DC 20301-3700.

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FCT PROGRAM ACHIEVEMENTS

The Services and U.S. Special Operations Command have completed 458 FCT projects since the Program's inception in 1980, with 71 projects ongoing. Of the completed projects, 238 were successful and the equipment or technology evaluated met the sponsor's requirements. Of the 238 successful projects, 164 projects (69%) resulted in U.S. procurements valued at \$7.1 billion.³ Over the same 25-year period, the program achieved an estimated Research, Development, Test and Evaluation (RDT&E) cost avoidance of about \$6.1 billion. Leveraging the defense investments of our allies and coalition partners reduces our total ownership costs. For example, in 2004 the Marine Corps Systems Command qualified and procured **Biocular Image Control Units**, developed by Brimar of the United Kingdom, for the M1A1 Main Battle Tank Fire Enhancement Program, avoiding an estimated \$2 million in development costs and anticipated production cost savings of about \$4 million. Similarly, the U.S. Special Operations Command's qualification and accelerated deployment of the Swedish **Fly-Away Satellite Communications (SATCOM) System** is estimated to have avoided \$8 million in development costs. The FCT Program:

- Contributes to international armaments cooperation
- Facilitates rapid fielding of crucial equipment
- Generates operational and life-cycle cost savings
- Improves and introduces new operational capabilities
- Reduces acquisition costs by avoiding new-start developments
- Contributes to risk reduction in major U.S. development programs
- Creates opportunities for industry teaming and production in the U.S.

❖ International Armaments Cooperation

The FCT Program supports U.S. international armaments cooperation by providing tangible evidence of the U.S. commitment to the "two-way street" in defense procurement. Substantial initial and follow-on U.S. procurements were made in FYs 2003 and 2004 from defense industries in countries such as Belgium, Canada, Denmark, Israel, Sweden, and the United Kingdom. The FCT Program has broadened the cooperation arena, through in-country visits and briefings, to stimulate the defense industrial participation of new NATO member countries. As a result, Polish industry is participating in the FCT Program for the first time, with the ongoing evaluation of advanced honeycomb **Replacement Structures for Navy Aircraft** involving PZL-Swidnik and Alcore of the U.S., initiated in FY 2003. Similarly, FCT has cultivated relationships in the Pacific region with Australia, Singapore, India, the Republic of Korea, and New Zealand. This particular outreach resulted in the first participation by New Zealand's defense industry in the FY 2004 FCT Program, with the U.S. Special Operations Command evaluation of Tamosoft's **Portable Wireless LAN (Local Area Network) Monitoring System** to meet Special Forces requirements for a component of the Joint Threat Warning System. Appendix A details participation in the FCT Program, by country. Appendix B lists the equipments selected for procurement as a result of successful FCT projects.



³ Amounts in FY 2004 constant year dollar.

❖ Rapid Fielding

The FCT Program's focus on mature technologies and equipment, coupled with a clear path to procurement by the sponsoring Service, quickly puts needed equipment into the hands of U.S. warfighters. The importance of responding rapidly to our nation's immediate warfighting requirements has repeatedly been underscored by Operation Desert Storm; the enforcement of UN sanctions on Iraq; U.S. and coalition operations in Somalia, Bosnia, Kosovo, and Macedonia; and Operations Enduring Freedom, Iraqi Freedom, and Noble Eagle. The FCT Program has demonstrated the ability to test, evaluate, and facilitate the procurement of systems quickly for use in such critical



missions during war and other operations, such as peacekeeping and military operations in urban terrain.

7.62mm Lightweight Machine Guns

and ***Semi-Rigid Ammunition Containers***, both produced by FN Herstal of Belgium and Columbia, South Carolina, were successfully evaluated by the U.S. Special Operations Command on an accelerated urgent schedule. With the test program completed, production contracts were awarded and initial weapons were fielded to Navy SEAL teams in combat in less than 12 months from FCT project start to finish.



❖ Operational and Life-Cycle Cost Savings

Many of the items or technical processes acquired as a result of the FCT Program are beneficial and cost less to maintain than the items they replace. For example, by the end of Operation Desert Storm in 1991, the MH-53 Sea Stallion helicopter fleet was nearly grounded when severe sand erosion on the engine compressor blades resulted in premature engine removals. Excessive wear reduced the blades' operational life from the designed 2,500 hours to an average of 100 hours. It was learned the Russians had developed and fielded a unique turbine engine coating process as a result of their similar military experiences in the sandy environment of Afghanistan in the 1980's. The FCT Program successfully evaluated the ***Titanium-Nitride Erosion-Resistant Coating Process*** developed by the Ural Works of Civil Aviation (PRAD) of Russia, and the Navy began transitioning the technology in 2002. Currently, General Electric Aircraft Engines (GEAE) T64-GE-416 and 416A engines for Marine Corps CH-53 helicopters are receiving the erosion-resistant coated compressor airfoils. GEAE is manufacturing the bare airfoils at its plant in Rutland, Vermont, and MDS-PRAD (the joint venture undertaking with MDS Aerospace of Canada) is applying their ER-7 coatings at their facility in Prince Edward Island, Canada. As 2005 began, GEAE had delivered 239 T-64 engine sets with approximately 2,400 coated airfoils per compressor set; 109 ready-for-issue engines have been issued to the fleet; and 73 engines have been installed. The Marine Corps CH-46E helicopter program has approved the MDS-PRAD coating for incorporation into production T58-GE-16A ERIP engines. The Navy predicts the process will double or triple the operational life over that of uncoated blades.



❖ Improved and New Operational Capabilities for U.S. Forces

FCT continues a very successful track record of qualifying items for procurement that meet a wide range of warfighter requirements, supporting all the Services and the U.S. Special Operations Command. FCT test and evaluation projects encompass tactical communications; chemical-biological detection and protection equipment; landmine detection and clearing; submarine and surface combatant systems; land warfare mobile electric power; direct-fire weapons and ammunition; naval mine countermeasures, and many others.

The Navy's qualification of the Beaufort Air-Sea Equipment, Ltd., ***MK10 Submarine Escape and Immersion Ensemble*** for backfit on U.S. submarines introduced a dramatic improvement over the Steinke Hood escape systems they are replacing, increasing the capability for safe escape from depths of 350 feet to 600 feet, while reducing the overall risk of injury to escapers from disabled submarines at all depths. *"The design is ideal for survival at sea. This is a far more viable option than the Steinke Hood....those few moments of discomfort could be the difference between life and death for Navy submariners"*- **Commanding Officer, USS Key West (SSN-722)**. In addition to providing new capabilities, FCT successes improve current capabilities and help support increased operational readiness and tempo. The introduction of Ultra Electronics' ***High Pressure Pure Air Generator (HiPPAG)*** into the Navy's newest combat



aircraft, the F/A-18 E/F Super Hornet, and Marine Corps' AV-8 Harrier aircraft and AH-1 Cobra attack helicopters provides unlimited cooling of infrared missile seekers, making the missile available for combat engagement at any time during a flight mission. The previous nitrogen bottle-method of cooling missile seeker heads limited missile availability to 1.5 hours. Replacement of the bottles required the wings of the aircraft to be folded down within reach of maintenance

crews and then pushed back to the folded position, a dangerous and arduous task on a carrier flight deck. HiPPAG is deployed with aviation units in Iraq, including the aforementioned Super Hornet in its combat debut in November, 2002, from the aircraft carrier USS Abraham Lincoln to strike air-defense sites in southern Iraq. Appendix C notes further examples of FCT-evaluated equipments that have improved the capabilities of U.S. forces.

❖ Reducing Acquisition Costs by Avoiding New-Start Development

The FCT Program reduces overall DoD acquisition costs by promoting the procurement of mature equipment and technologies nearing production or already in service in the host nation, thereby reducing expenditures for research and development. Qualifying an item already in production can lower the unit procurement cost for both the U.S. and the host nation's defense.

The competition of foreign vendors also oftentimes lowers acquisition costs and improves warranties or contractual guarantees from both U.S. and foreign vendors. Successes include the Saab Bofors Dynamics ***AT-4CS (Confined Space) Disposable Shoulder-Fired 84mm Weapon***. Evaluated by the U.S. Special Operations Command, this FCT success achieved an estimated \$25 million development cost avoidance by leveraging previous U.S. military AT-4 efforts, \$5 million in production savings, and \$2 million in operations/life-cycle cost savings. In addition, the capability of U.S. Special Forces and U.S.

Army gunners to engage targets from confined spaces is a significant improvement for operations in urban areas, as evidenced by the weapon's employment in Afghanistan and Iraq.





The Air Force qualification and procurement of the French ***Emergency Aircraft Arresting System*** developed by AérAzur achieved an estimated \$10 million in development cost avoidance, \$9 million in production cost savings, \$6 million in life-cycle cost savings over the previous BAK-12 arresting system units, and 4 years accelerated fielding time. Appendix D provides more examples of estimated development cost avoidance from successful FCT projects.

❖ Risk Reduction in Major U.S. Development and Upgrade Programs

The FCT Program has contributed to reduced technical, cost, and schedule risk for several major U.S. development and upgrade programs. For example, the British QinetiQ software baseline used in the test vehicle for the ***Prophet Ground Tactical Ground-Based Signals Intelligence (SIGINT) System*** FCT project was adopted as the basis for development of the Prophet Block II/III ES sensor suite by the Army's Program Executive Officer for Intelligence, Electronic Warfare, and Sensors. The technology advancements achieved from this FCT effort successfully carried forward into the Block II/III SDD program and significantly shortened the Prophet Ground development cycle.



Similarly, the successful two-year test and evaluation of ammunition candidates from Raufoss of Norway and Mauser of Germany for the ***30mm Armor-Piercing Fin-Stabilized Discarding Sabot-Tracer (APFSDS-T) Round*** for the Expeditionary Fighting Vehicle (EFV) main gun saved the Marine Corps an estimated 10- to 12-year development effort. An estimated \$10 million in research and development costs and

\$2 million in potential production costs were achieved when both candidates met the firepower requirements for the System Development and Demonstration phase of the EFV Program. The Marine Corps Systems Command has also sponsored five other FCT projects to evaluate essential components for the EFV.



❖ Teaming Opportunities for U.S. and Foreign Industry

FCT projects often result in foreign industry-U.S. industry teaming. These business arrangements include marketing agreements and licensed production of the foreign item in the U.S. upon successful FCT project completion. This strengthens the U.S. industrial base, creating American jobs and improving the "two-way street," while helping U.S. domestic defense industries to sell their products overseas. FCT teaming and manufacturing arrangements have benefited 25 states, 43 cities, and more than 40 company branches across a spectrum of industries including electronics, automotive, textiles, heavy equipment, and ammunition. The procurement in 2001 of the ***Swedish BOL Countermeasures Dispenser*** for Navy and Air Force aircraft resulted from the teaming of Sweden's Saab Tech (formerly the Celsius Group), Alloy Surfaces of Chester Township, Pennsylvania (a U.S. company, now a division of Chemring of the United Kingdom), and BAE Systems North America in Austin, Texas. The BOL dispensers and associated BOL chaff and flare expendables are in service on Navy F-14s and F/A-18C/Ds, and Air Force and Air National Guard F-15 aircraft.



The South African ***“Buffalo” Mine-Protected Clearance Vehicle*** developed by Denel-Mechem was successfully evaluated by the Army and is being produced in Ladson, South Carolina, by Denel’s U.S. teaming partner, Technical Solutions Group. Buffalo is a blast-



resistant vehicle designed to protect soldiers from the effects of landmine explosions during route clearance operations and is currently operating with the 612th Engineer Battalion in Iraq as part of the Army’s Ground Standoff Minefield Detection (GSTAMIDS) Block 0 system. Buffalo uses a

hydraulic arm to interrogate suspected mine sites, including Improvised Explosive Devices (IEDs). According to Battalion personnel, the Buffalo is extremely survivable, ***“These vehicles***

have been hit several times...and no one inside has ever been hurt...soldiers want to ride in this...find the IEDs and protect their fellow soldiers.” Following a successful FCT evaluation in FY 2001,

the Air Force awarded a contract worth \$435 million to Static Engineering of Australia and its U.S. partner, FMC Corporation of Orlando, Florida, to produce the ***Next Generation 25K “Halvorsen” Cargo Loader*** at FMC facilities in three U.S. states. The Australian product was adopted as the standard 25K loader for the Air Force and has been deployed with Air Force airlift units in Afghanistan and Iraq since the beginning of Operation Enduring Freedom. Appendix D provides more examples of teaming opportunities and U.S. production resulting from the FCT Program.



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HIGHLIGHTS OF THE FY 2003-2004 FCT PROGRAM

Projects Completed in FYs 2003 and 2004. Forty-seven FCT projects completed test and evaluation during FYs 2003-2004. The foreign items under evaluation in 26 of these projects met Service and/or U.S. Special Operations Command requirements, leading to the selection for initial U.S. procurements in 18 cases (marked in blue, below). These 47 projects are described in the following pages of this Annual Review.

Table 1. Projects Completed in Fiscal Years 2003 and 2004 (start year as indicated)

Sponsor	Project
Army	40mm Dud Reducing M430A1E1 HEDP Cartridge – 2002 Ballistic Armor for Helicopters – 2003 Bradley Fighting Vehicle Long-Life Roadwheels – 2001 Driver's Vision Enhancer – 2001 Fuel Cells for Dismounted Soldiers – 2003 Gamma Titanium Aluminide Sheet – 2004 Lightweight Chemical Agent Detector – 2001 Optically Improved Standard Advanced Dewar Assembly Type II for HTI – 2001 Prophet Ground Tactical Ground Based Signals Intelligence (SIGINT) System – 2001 Self-Destruct Fuze for Multiple Launch Rocket System – 2002 Silverized Kevlar – 2002 Standard Advanced Dewar Assembly Type I for HTI – 1997
Navy	Biosensors for Explosive Detection – 2004 Corona Monitoring System – 2003 Infrared Decoy – 2002 Multi-Bandwidth Submarine AZE Antenna – 2001 Star Tracker (joint with Air Force) – 2000 Submarine Torpedo Room Berthing Pod – 2001 Underwater Communications & Tracking System for Submarines – 2003
Marine Corps	Assault Breacher Vehicle Mine Plow and Lane Marking System – 2002 Biocular Image Control Unit – 2004 Communications Distribution System – 2002 High-Rate-of-Fire .50 Caliber Machine Gun – 2003 Lightweight Aluminum Track for Expeditionary Fighting Vehicle – 1998 Lightweight Diesel-Driven APU for Expeditionary Fighting Vehicle – 2000 Self-Destruct Fuze for Multiple Rocket Launch System – 2004 Skin and Open Wound Decontamination Lotion – 2001
Air Force	Airborne Video Recorder/Replay System – 2001 Eagle Vision Sensor Upgrades – 2002 Fiber-Optic Security Fence – 2002 Man-Portable Intrusion Detection System – 2003 Plastic Practice Bombs – 1999 Self-Regulating Anti-g Ensemble – 2002
U.S. Special Operations Command	7.62mm Lightweight Machine Gun – 2002 Advanced Demolition Weapons – 2001 Advanced Lightweight Grenade Launcher Ammunition – 1999 Body Armor Flotation Vest – 2003 Body-Worn Radar Detection Receivers – 2003 Fly-Away SATCOM (Satellite Communications) System – 2003 Gunfire Detection System – 1999 Man-Portable Multi-Sensor System Headsets and Sensors – 2001 MC130-H Aerial Refueling System Pod – 1999 Parachute Leaflet Delivery System – 1999 Semi-Rigid Ammunition Containers for MK48 7.62mm Machine Gun – 2004 Stand-Alone Cooling Suit – 2002 Ultra Light Aero Diesel Engine – 2003 Wireless LAN (Local Area Network) Monitoring – 2003

First-Time Procurements. The twenty projects listed in Table 2 (some of which were completed in prior years) resulted in first-time production procurements by the Services and U.S. Special Operations Command in FYs 2003-2004 and early FY 2005, valued at \$182.91 million.

Table 2. Fiscal Years 2003-2004 and Early Fiscal Year 2005 First-Time Procurements of FCT-Evaluated Products

Service	FCT Project	Country	Vendor	Value (\$M)
Army	Improved Battery Cells	Canada	Moli Energy	7.35
Army	Prophet Ground Tactical Ground-Based Signal Intelligence (SIGINT)	UK	QinetiQ	1.30
Navy	VLF/LF Composite Bushing Replacement	Switzerland	Tyco Electronics	0.04
Navy	Corona Monitoring System for High-Powered VLF/LF Transmitting Stations	South Africa	Centre for Integrated Sensing Systems	0.06
USMC	Biocular Image Control Unit for M1A1	UK	Brimar	2.90
USMC	Communications Distribution System	Canada	Computing Devices	2.60
USMC	Assault Breacher Vehicle Mine Plow and Lane Marking System	UK	Pearson Engineering	11.70
USMC	JSLIST Alternative Footwear (urgent Navy procurement-project continuing)	Canada	Acton International	6.50
USMC	Rapid-Fire .50 Caliber Machine Gun	Belgium	FN Herstal	10.00
Air Force	Eagle Vision Sensor Upgrades (SPOT 5)	France	EADS	3.50
USSOCOM	7.62mm Lightweight Machine Gun	Belgium	FN Herstal	3.44
USSOCOM	Advanced Demolition Weapons (AT-4CS, Panzerfaust)	Sweden	Saab Bofors Dynamics	15.87
USSOCOM	Body Worn Radar Detection Receivers	UK	QinetiQ	4.96
USSOCOM	Chemical Protective Gloves	Canada	Cloutier	7.68
USSOCOM	Fly-Away SATCOM System	Sweden	SweDish	33.10
USSOCOM	Man-Portable Multi-Sensor System Headsets and Sensors	Denmark, Israel	NextLink Source of Sound	6.46
USSOCOM	MC-130H Aerial Refueling System Pod	UK	Flight Refuelling	54.20
USSOCOM	Parachute Leaflet Delivery System-Snow Goose	Canada`	MMist	9.89
USSOCOM	Semi-Rigid Ammunition Container for MK48 7.62mm Lightweight Machine Gun	Belgium	FN Herstal	1.00
USSOCOM	Wireless LAN Monitoring	New Zealand	TamoSoft	0.36
		Total First-Time Procurements		182.91

Follow-On Procurements. During FYs 2003 and 2004, follow-on procurements worth \$568.64 million stemmed from prior year FCT successes. These items are listed in Table 3. These figures do not include any of the items listed in Table 2 (first-time procurements during FY 2003-2004).

Table 3. Fiscal Years 2003-2004 Follow-On Procurements of FCT-Evaluated Equipment

Service	FCT Project	Country	Vendor	Value (\$M)
Army	7.62mm Short Range Training Ammo	Canada	SNC Technologies	0.30
Army	Automatic Chemical Agent Detector Alarm (ACADA) and ACADA Power Supplies	UK	Smiths Detection	35.20
Army	Ground and Vehicle Mounting System	Germany	Sachtler GmbH	3.10
Army	Gun Laying & Positioning System	Switzerland	Leica Heerbrugg	12.50
Army	High Mobility Engineer Excavator	Australia	ADI	25.00
Army	Improved Chemical Agent Monitors	UK	Smiths Detection	27.60
Army/USMC	L96/L97 Anti-Riot Grenades for LVOSS	UK	PW Defence, Ltd.	0.80
Army	Less than 3KW Generator Sets (MEP)	Canada	Mechron Energy	5.90
Army	Mine-Protected Clearance Vehicle	South Africa	Denel Mechchem and TSG- Ladson, SC	70.00
Army	Powered Multi-Fuel Burners	Canada	Teleflex	28.50
Army	Ultra Lightweight Camouflage Screening	Sweden	Saab Barracuda	125.00
Army	M119 105mm Lightweight Howitzer	UK	BAE (Watervliet Arsenal)	20.00
Navy	Anti-Jam GPS Antenna	UK	Raytheon Systems, Ltd.	0.07
Navy	Atmospheric Diving Suit NEWTSUIT	Canada	Int'l Hardsuit	4.00
Navy	BOL Countermeasures Chaff/IR Flare Expendables for F-14	Sweden	Saab Avionics	3.80
Navy	BROACH Unitary Warhead for AGM-154C	UK	BAE Systems	10.50
Navy	Digital Flight Control System for F-14	UK	BAE	29.70
Navy	Expeditionary Airfield Light-Duty Mats	France	Deschamps	0.70
Navy	HiPPAG for F-18E/F, AV-8B, AH-1	UK	Ultra Electronics	11.10
Navy	Submarine Escape & Immersion Equipment	UK	Beaufort Air-Sea	15.50
Navy	TiN Erosion-Resistant Coatings	Russia/Canada	MDS-PRAD	10.80
USMC	30mm APFSDS Tracer Rounds for Expeditionary Fighting Vehicle	Norway, Switzerland	NAMMO, Oerlikon Contraves	3.00
USMC	40mm Training Cartridge MK281	Germany	Nico Pyrotechnik	14.90
SOCOM	5.56 Lightweight Machine Gun-MK46	Belgium	FN Herstal	3.40
SOCOM	Gunfire Detection System	France	Metravib	6.60
SOCOM	Joint RAAWS Ammunition Upgrades	Sweden	Saab Bofors Dynamics	2.65
Air Force	Eagle Vision Deployable Ground Station	France	EADS	18.00
Air Force	Emergency Aircraft Arresting System	France	Aerazur	0.70
Air Force	F-15A/B Countermeasures (BOL)	Sweden	Saab Avionics	16.10
Air Force	Next Generation Small Loader	Australia	Static Engineering	49.00
Air Force	Retractable Arresting Cable System	France	Aerazur	0.32
Air Force	Uncooled Thermal Imager (Sentry)	Sweden	FLIR Systems	13.90
Total Follow-On Procurements				568.64

PROJECTS COMPLETED IN FYs 2003 – 2004
(year of project initiation as indicated)



ARMY

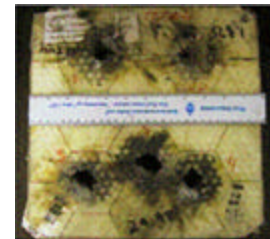
40mm Dud-Reducing M430A1E1 Cartridge – Germany, Singapore – 2002



This project evaluated dud-reducing ammunition fuzes, developed by *Chartered Ammunition Industries of Singapore* and *Junghans/Kaman-Dayron of Germany*, for effectiveness, safety, and feasibility when integrated into the current 40mm M430A1 High Explosive Dual Purpose Cartridge. The current fuze experiences a relatively high dud rate when fired against soft targets, such as sand or snow. This dud rate creates a dangerous unexploded ordnance situation for friendly forces that must subsequently maneuver over the same terrain, as well as for innocent civilians. The Product Manager for Small Arms, Picatinny Arsenal, New Jersey, conducted the test program with technical test support from American Ordnance, Milan, Tennessee. Preliminary technical analyses and bid sample tests were completed in December 2003 at Aberdeen Test Center, Maryland, Picatinny Arsenal, and American Ordnance, with disappointing results. Neither fuze design was able to meet all the prescribed test criteria, although the Charter Ammunition candidate was successful in all tests but the in-flight self-destruct demonstration. The FCT project was discontinued by the Army in July 2004 when substantial funding to re-structure the test program and continue evaluation of the Singapore fuze was not approved by OSD.

Ballistic Armor for Helicopters – Australia, Canada, Germany, United Kingdom – 2003

This project evaluated lightweight ballistic armor that was developed for law enforcement use by *Armor Australia P/L* and *Australian Defense Apparel Pty Ltd. of Australia*, *ACERAM Technologies of Canada*, *Advanced Ferrite Technology GmbH of Germany*, and *Meggitt Armour of the United Kingdom*. The objective was to determine if the candidates would provide increased ballistic protection over the current armor and reduce the overall weight of the Army's RAH-66 Armed Reconnaissance-Attack Helicopter, thereby improving operational performance. The Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, Alabama, completed the test program in February 2004. None of the candidates met the specified requirements and, with the cancellation of the RAH-66 development program, the FCT project was discontinued.



Bradley Fighting Vehicle Long-Life Roadwheels – Canada, Republic of South Africa – 2001



This project evaluated polyurethane coatings for combat vehicle roadwheels, developed by *Elastochem Specialty Chemicals of Canada*, *Allthane Technologies of the Republic of South Africa*, and *Winfield Industries of Buffalo, New York*, to upgrade the M2/M3 Bradley Fighting Vehicle and extend its service life for a three-fold cost savings over the current rubber roadwheels (representative photo comparison at left). Through adaptations over the years, the Bradley Fighting Vehicle has been upgraded to stay ahead of changing missions, capabilities, and technologies, resulting in more weight being added to the vehicle and more stress exerted on the roadwheels. The Army's Tank Automotive and Armaments Command, Warren, Michigan, conducted the test program at Yuma Proving

Grounds, Arizona, and the Army's Cold Regions Test Center at Fort Greeley, Alaska, with technical support from the Bradley Fighting Vehicle developer United Defense Limited Partnership of San Jose, California, and comparison rubber roadwheels supplied by the Red River Army Depot, Texarkana, Texas. Ride quality and shock and vibration testing was completed at Yuma Proving Grounds in July 2002, followed by endurance testing over hilly, paved, and gravel courses. All testing was completed in May 2003. No vendor reached the target mileage of 10,000; however, the Winfield roadwheel performance and configuration was determined to be more viable and procurement of the U.S. product was recommended. Several roadwheels manufactured by Allthane Technologies were sent to Iraq for use in theater. Although not formally being tested, their performance is being monitored.

Driver's Vision Enhancer – Canada – 2001

This project evaluated thermal imaging systems manufactured by *Thales Optronique of Canada*, and *DRS Technologies of Parsippany, New Jersey*, for integration into the Army's Driver's Vision Enhancer (DVEII) Program. Vision enhancer devices are critical during combat operations, allowing operators of wheeled and track vehicles to see in dark and obscured conditions. The Army's Night Vision and Electronic Sensors Directorate at Fort Belvoir, Virginia, conducted the test program, which was completed in May 2003. The Thales system met the critical performance requirements and was deemed qualified as a Second Source; however, the DRS Technologies' system won in a full and open competition in April 2004 and is being procured by the Army.



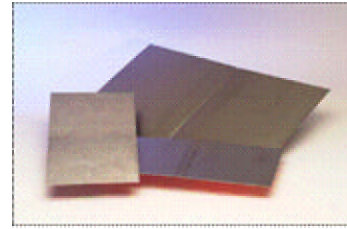
Fuel Cells for Dismounted Soldiers – Canada, Germany, United Kingdom – 2003

This project evaluated electrochemical fuel cells that were developed by *Ballard Power Systems and Hydrogenics of Canada*, *NoVars and Smart Fuel Cells of Germany*, *Advanced Power Sources, Ltd. of the United Kingdom*, and candidates from *DCH Technology, Ball Aerospace, Inc., and Lyntech of the U.S.* to determine if they met Army requirements for longer lasting, lighter weight portable power sources. Improved power sources are critical for all components of the Future Force. The Army Communications and Electronics Command at Fort Monmouth, New Jersey, in conjunction with the Army Program Manager for Mobile Electric Power and the Corps of Engineers Research and Development Laboratory, Champaign, Illinois, conducted the test program at the Fuel Cell Test Laboratory, Fort Belvoir, Virginia, and at FCTech, Johnstown, Pennsylvania. All testing was completed by the end of FY 2004. It was concluded that the units evaluated were not developed to the level required for operational use outside a laboratory setting. However, the Ballard (Canada) and Smart Fuel Cell (Germany) systems have been superseded by follow-on units which appear to be at a much higher level of development and are being evaluated further outside the FCT Program. Initial follow-on tests of units in development by Smart Fuel Cells are reportedly impressive, benefiting from the lessons learned from the FCT project.



Gamma Titanium Aluminide Sheets – Austria – 2004

The objective of this project was to evaluate gamma-titanium aluminide sheets produced by *Plansee of Austria* as a potential replacement for current structural components used on Army helicopter manifolds and exhaust firewalls. The potential benefits of γ -TiAl are being recognized throughout the aerospace community, and the Austrian Gamma-Met PX alloy promised a 15% weight reduction compared to conventional titanium. Gamma titanium aluminide was scheduled to be used on the main engine de-swirl/S-ducts, the SPU exhaust ducts and the turning vanes of the RAH-66 Comanche aircraft. With cancellation of the RAH-66 Comanche development program the FCT project was terminated, prior to the purchase of any materials or the initiation of any testing.



Lightweight Chemical Agent Detector – Finland, United Kingdom – 2001

This project evaluated two lightweight chemical agent detectors, the LCD-3 manufactured by *Smiths Detection of the United Kingdom (formerly Graseby Dynamics)* (left), and the ChemPro 100 manufactured by *EnviroNics Oy of Finland* (right), to determine whether they meet or exceed the requirement for personal warning and protection under the specifications for the Joint Chemical Agent Detector (JCAD) development program. The FCT test program was conducted by the Program Manager for NBC Defense (now NBC Contamination Avoidance Joint Program Manager for Joint Program Executive Officer-Chemical and Biological Defense (JPEO-CBD)) in Edgewood, Maryland. While the FCT project was in process, the overall JCAD Program was re-structured with new requirements and re-solicitations were issued. The FCT effort was discontinued; however, Smiths and EnviroNics were allowed to use the test results of the FCT project for product improvements in order to meet the JCAD requirements. All technologies as presented from the various vendors are under consideration with the revised JCAD Program.



Optically Improved Standard Advanced Dewar Assembly Type II – France – 2001



This project evaluated *SOFRADIR's* Optically Improved Standard Advanced Dewar Assembly-Type II (OI SADA II) for integration into the Army's Horizontal Technology Integration Program Second-Generation FLIRs (Forward-Looking Infrared Radar). The French assembly incorporates the latest optical improvements and represents state-of-the-art FLIR detector/dewar performance. The Program Manager, FLIR Systems, conducted the test program at the Army's

Night Vision and Electronic Sensors Directorate, Fort Belvoir, Virginia. A test article contract was awarded to SOFRADIR in FY 2001. Included in the FCT evaluation were domestic candidates developed by DRS Infrared Technologies, Dallas, Texas, and Raytheon Vision Systems, Goleta, California. Due to the test results in the early stages of the project, the Army made an initial production buy in early FY 2002 from SOFRADIR of 110 optically-improved units valued at \$3.8 million. The Army held a full and open competition for OI SADAs Type II in mid-FY 2003. The SOFRADIR assemblies evaluated in the FCT project met the requirements of the solicitation, but lost in the competitive procurement. Proposals submitted by DRS and Raytheon were substantially lower in cost than that submitted by SOFRADIR.

Prophet Ground Tactical Ground Based Signals Intelligence (SIGINT) System – Canada, Israel, United Kingdom – Army – 2001

This project evaluated the capabilities of signals intelligence subsystems developed by the *Defense Research Establishment-Ottawa, Canada*; *Tadiran of Israel*; *Thales Defense Ltd.* and *QinetiQ of the United Kingdom*; and *BAE Systems* and *Tadiran of the U.S.*, to detect the presence of conventional and agile signals. The Army's Program Executive Officer for Intelligence, Electronic Warfare, and Sensors conducted the test program at Fort Monmouth, New Jersey, and Fort Huachuca, Arizona. Primary test objectives were to verify technical feasibility and reduce the risk of meeting Block III SIGINT requirements, thereby shortening the overall Block III development cycle. Following a Full and Open Competition, the Army awarded the Block III System Development and Demonstration (SDD) contract worth approximately \$8.3 million to General Dynamics Decision Systems based in Scottsdale, Arizona (teamed with Raytheon and QinetiQ as ES sensor developers). The software baseline used for the FCT project vehicle was adopted as the basis for the development of the Prophet Block II/III ES sensor software. The technology advancements achieved from this FCT effort successfully carried forward into the Block II/III SDD program and significantly shortened the Prophet Ground development cycle. The completed Prophet Block II/III development proceeded to acceptance testing in FY 2004 and first units were equipped in early FY 2005.



Self-Destruct Fuze for Multiple Launch Rocket System – Israel – 2002

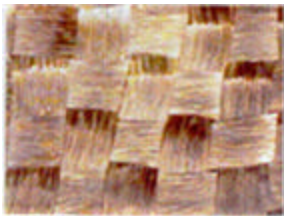


This project evaluated the performance, safety, and feasibility of a self-destruct fuze developed by *Israeli Military Industries (IMI)* of Israel, variants of which are fielded with Israeli armed forces. The objective was to integrate the fuze into submunitions of the MLRS for tests to ensure that the resultant



submunitions' dud rate would be less than one percent. The Army Aviation and Missile Command at Redstone Arsenal, Alabama, conducted the test program. The IMI self-destruct fuze did not meet the reliability requirements when dispense-tested from the GMLRS DPICM rocket. After reviewing all the data it was decided not to proceed with the Israeli fuze at this time, and the project was recommended for termination. The final report will be issued in fourth quarter FY 2005.

Silverized Kevlar – Canada – 2002



Silverized Kevlar developed by *Silverleaf Materials, Ltd. of Canada*, along with other non-woven materials, was evaluated for potential use on the upper pylon of the Army's Comanche RAH-66 Armed Reconnaissance/Attack helicopter. The

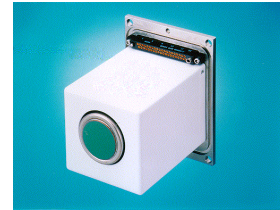


planned purpose was to enhance the performance characteristics of the structure with regard to conductive ground plane, electro-magnetic interference shielding, static discharge and overall weight savings by eliminating layers of parasitic conductive materials. The test program was conducted by the Army's Aviation Applied Technology Directorate located at Fort Eustis, Virginia, at the vendor's facilities in Ottawa, and at the Sikorsky Aircraft

Corporation, Bridgeport, Connecticut. In the final analysis, it was determined there were other less expensive, less degradable alternatives providing equivalent or greater weight savings than the Silverized Kevlar. The FCT project was discontinued in fourth quarter FY 2003.

Standard Advanced Dewar Assembly Type I – France, Germany – 1997

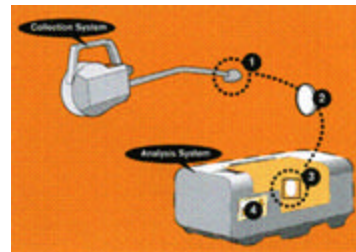
The Standard Advanced Dewar Assembly-Type I (SADA I) is an integral part of the Army's second-generation infrared imaging system used in fixed and rotary wing aircraft. SADA I modules developed by *Societe Francaise de Detecteurs Infrarouge (SOFRADIR) of France* and *AEG Infrarot Modules (AIM) of Germany* were evaluated for use in major Army systems, such as the RAH-66 Comanche helicopter and modernization upgrades to the AH-64 Apache helicopter. The Program Manager, FLIR (Forward-Looking Infrared Radar) Systems, managed the test program at the Army's Night Vision and Electronic Sensors Directorate (NVESD), Fort Belvoir, Virginia, with participation by the Boeing Aircraft Company and Lockheed Martin. AIM is currently completing qualification tests on the Non-Optically Improved (OI) version of SADA I and is completing development of an OI version of SADA I which is expected to undergo qualification testing starting in May 2005 with Army funding. AIM is expected to remain a competitive supplier for the U.S. Apache systems. In addition, AIM will be a key supplier for Foreign Military Sales versions of the Apache second generation FLIR capability.



NAVY

Biosensors for Explosives Detection – Sweden – 2004

Biosens-E explosive detectors developed by *Biosensors Applications of Sweden* were evaluated to meet urgent requirements for countering Improvised Explosives Devices (IEDs). A comparison was made of the performance of the Swedish equipment in the field against actual IEDs to the results of tests of conventional explosive detection technologies which have been conducted by the Navy over the past 4 years. The Swedish company's drug and mine detectors based on the same technology are in use worldwide. The Navy Explosive Ordnance Disposal Technical Division, Naval Surface Warfare Center, Indian Head, Maryland, is conducting the project. The test articles were delivered to Indian Head in second quarter FY 2004 and underwent laboratory characterization tests. Results of the equipment as presented by the vendor were not within the required thresholds. The Navy discontinued the test effort in fourth quarter FY 2004.



Corona Monitoring System – Israel, Republic of South Africa – 2003

The Corona Monitoring project evaluated two commercially available daylight corona detection cameras manufactured by *OFIL, Ltd. of Israel* and the *Centre for Integrated Sensing Systems (CSIR) of the Republic of South Africa*. Corona is a damaging phenomenon occurring when the electric field next to an object, such as a high power cable, exceeds the breakdown



value for air. The condition can put the antennas at any of the Navy's 10 VLF/LF communications shore stations out of operation, requiring lengthy and expensive repairs averaging \$300,000 per outage. Testing was conducted during FY 2003 by the Space and Naval Warfare Systems Center (SSC), San Diego, California, at the Navy's Dixon High Voltage Test Facility near Sacramento, California. The cameras were tested for their capabilities to remotely view very low frequency/low frequency (VLF/LF) high power transmitting systems. The cameras effectively detected damaging Corona on energized components within the transmitting station's helix tuning house, as well as outdoors on suspended insulators of the antenna structure. Both candidates performed successfully under varying conditions at VLF/LF frequencies and have been adopted as VLF troubleshooting assets at SSC. An estimated \$400,000 development cost avoidance was achieved through the use of FCT to meet the Navy's requirement.

Infrared (IR) Decoy – Canada – 2002

This project evaluated the Canadian MJU-5188 liquid pyrophoric infrared decoy, produced by *Magellan Aerospace*. The MJU-5188 was developed for tactical aircraft and had previously demonstrated excellent effectiveness in Canadian tests against advanced threats. The Naval Surface Warfare Center Crane Division, Indiana, conducted the test program at the Naval Air Warfare Center China Lake, California, with the assistance of the VX-31 Test Squadron. Air-to-air radiometric measurements were taken at China Lake, and material characterization measurements were conducted at the Open Jet Facility at Defence Research and Development, Canada-Valcartier, in late FY 2002. The MJU-5188 units did not exhibit the necessary spectral requirements during these tests. Countermeasure effectiveness of the MJU-5188 was considerably less than anticipated as compared with current Navy inventory Infrared Counter Measures (IRCM) systems and as evaluated against currently exploited threats. As a result of these test results, it was concluded that the Canadian MJU-5188 Infrared Decoy Flare was not satisfactory for Navy use, and the Navy discontinued its effort under the FCT Program.

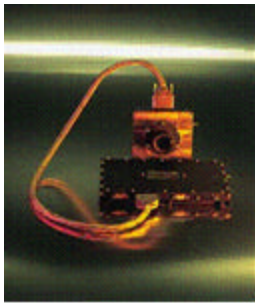
Multi-Bandwidth Submarine Antenna – United Kingdom – 2001

This project evaluated the *Thales Underwater Systems (formerly Thomson Marconi)* AZE antenna with the objective of enhancing the UHF MILSATCOM performance of the OE-538 Multifunction Communications Mast used on all U.S. submarines. The antenna was initially designed as a satellite communications antenna and had its performance maximized in the high angles (upwardly looking direction). The intended application of this antenna on the OE-538 mast for the U.S. Navy was to support not only Global Positioning System (GPS) and Identification Friend-or-Foe (IFF), which require high angle performance, but also for application to L-Band mobile subscriber service communications and wireless networking, which require better



performance at lower angles. The Space and Naval Warfare Systems Command, San Diego, California, conducted the evaluation at the Naval Undersea Warfare Center, Newport, Rhode Island. A comparison of the L-band response of the Thales antenna to the key performance parameters revealed that there was insufficient gain at the low angles to support Navy procurement and use of this antenna at the higher frequencies for mobile subscriber service and wireless networking. No procurements are planned at this time.

Star Tracker — Denmark (joint with Air Force) – 2000



The Navy and Air Force evaluated the *Terma Elektronik* HE 5AS Star Tracker system capabilities to provide absolute three-axis attitude for spacecraft control, pointing of payloads, and localization of ground observation. The Danish item offered a reliable and affordable attitude determination system for a wide range of DoD satellite programs, and the project addressed the requirements of three of them: Military Satellite Communications (MILSATCOM) and Space Based Infrared Systems Low (SBIRS-Low) – both of Air Force interest, and Full-Sky Astrometric Mapping Explorer (FAME) – of Navy interest. Overall, FCT testing was intended to characterize the performance and radiation hardness of the

Danish Star Tracker. The project was led by the Naval Center for Space Technology, Naval Research Laboratory (NRL) in Washington, DC. NRL determined that the Terma Star Tracker was fully compliant with performance requirements. The FCT test program has been completed, with the Star Tracker determined to be qualified for procurement and fielding for future satellite mission requirements.

Submarine Torpedo Room Berthing Pod – Netherlands – 2001



This project evaluated berthing pods for submarines, manufactured by *Polymarin* for the Royal Netherlands Navy. The evaluation of these pods addressed a long-standing habitability situation, in that crewmembers are regularly required to sleep in temporary torpedo room berths on several classes of U.S. submarines. The Dutch berthing



pod is the size of a MK 48 torpedo and has three berths with individual lighting, forced-air ventilation, and storage space when opened. The Commander of Submarine Forces, U.S. Atlantic Fleet, supported the FCT test program with involvement by Submarine Development Squadron Twelve, Norfolk, Virginia, and Submarine Squadron Four, Groton, Connecticut. The pods are not needed on Navy SSBNs or SSGNs because crew berthing on these submarines is already adequate. Since the pods evaluated appear to be suitable for use on the first submarines of the new VIRGINIA Class, additional procurements will not be required for several years.

Underwater Communications & Tracking System for Submarines – Australia – 2003



This project evaluated the suitability of an underwater digital communication system designed for the exchange of real-time position information data between submarines participating in open ocean exercises. Developed by *Nautronix Maripro*, the “HAIL” (Hydro-Acoustic Information Link) is a low-data-rate digital spread spectrum communications system for submarines using installed acoustic transmitter/receivers. The system had been demonstrated previously with great success in joint U.S.-Australian exercises. The objective is to integrate the HAIL

system into the Navy’s AN/BQQ-10A-RCI sonar system. The Program Executive Officer, Submarines-Combat Systems Program Office, Naval Sea Systems Command, conducted the test program in coordination with the Commander of Submarine Forces, U.S. Pacific Fleet, the Naval Undersea Warfare Center (NUWC) Keyport Division, Washington, and Commander, Operational Test and Evaluation Force. During the same period, the Australian system was installed at the underwater instrumented Pacific Missile Range Facility-Barking Sands, Kauai, Hawaii, and testing was conducted successfully in January 2005. A Navy procurement decision is pending.



MARINE CORPS

Assault Breacher Mine Plow, Lane Marking System– United Kingdom, Israel –2002

This project evaluated mine clearing systems manufactured by *Pearson Engineering of the United Kingdom* and *Israel Aircraft Industries (IAI) RAMTA Division*. The objective was to verify vendor performance claims and to satisfy the requirement for in-stride breaching capability, operational suitability, and shock and mine blast when integrated in the Assault Breacher Vehicle.



The Marine Corps Systems Command in Quantico, Virginia, conducted the successful test program in conjunction with the Marine Corps Operational Test and Evaluation Activity at Aberdeen, Maryland; the Army’s Waterways Experiment Station in Vicksburg, Mississippi; and the Marine Corps Air Ground Combat Center at Twentynine Palms, California. With the onset of hostilities in Iraq, 20 British systems were procured on an urgent basis and were deployed with the 1st Marine Division mounted on M1A1 Main Battle Tanks in support of Operation Iraqi Freedom. The FCT project was successfully completed in early FY 2004 and resulted in a significant procurement of over \$11.7 million. It is estimated that a development cost avoidance of \$8.9 million, production cost savings of \$6 million, and anticipated operations and life-cycle cost savings of \$7.5 million were achieved. In addition, the Marine Corps project officer for this FCT was selected as the 2003 FCT Program Manager of the Year by the Deputy Under Secretary of Defense (Advanced Systems & Concepts), overall administrator of the FCT Program.

Biocular Image Control Unit for M1A1 Main Battle Tank – United Kingdom – 2004

This project evaluated the Biocular Image Control Unit (BICU) developed by *Brimar of the UK* for application to the Marine Corps' M1A1 Firepower Enhancement Program (FEP). The BICU directly supports tank crew situational awareness by enabling 2nd generation Forward Looking Infrared (FLIR) imagery to be displayed in the Gunner's Primary Sight monocular display as well as in the biocular display. The BICU significantly reduces gunner's fatigue and enables the crewman to utilize the best

features of direct view optics and FLIR imagery to acquire and engage targets. The project was managed by the Project Office M1A1 Tank, Marine Corps Systems Command Armor & Fire Support Systems at Quantico, Virginia. An accelerated integration and test program was conducted at the Army Night Vision and Electronic Sensors Directorate at Fort Belvoir, Virginia; Aberdeen Test Center, Maryland; Eglin AFB, Florida; Yuma Proving Ground, Arizona; Twentynine Palms, California; and at Raytheon Corporation facilities in McKinney, Texas. In December 2004, Milestone C was achieved and the Marine Corps awarded contracts valued at approximately \$2.9 million to Brimar for full rate production of 192 FEP/BICUs and 12 initial spares FEP/BICUs. The first production units are deployed with the Marine Corps 2nd Tank Battalion in Iraq. With this successful project, an estimated \$1.5 million in development cost avoidance and anticipated \$4.1 million in production cost savings were achieved.

Communications Distribution System – Canada – 2002

This project evaluated a digital voice and data distribution system (MESHNet) developed by *Computing Devices Corporation of Canada* and currently fielded in Marine Corps ground command and control systems as a result of a previous FCT undertaking. For this project, the Canadian system was integrated with the KC-130 aircraft to meet requirements for Airborne Command Post complexes ranging from Marine Expeditionary Force headquarters to squadron level. The Marine Corps Systems Command, Quantico, Virginia,



conducted the test program in conjunction with the Naval Air Warfare Center at Patuxent River, Maryland; Marine Air Support Squadron One; and the Naval Surface Warfare Center Crane, Indiana. In FY 2003, KC-130 flight certification testing was completed, a limited warfare evaluation was successfully conducted, and the production of 7 Direct Air Support Central-Airborne Systems (picture above) was directed. The procurement value to date is over \$3.7 million, with options for additional future buys. Marine Air Support Squadron 3 in Miramar, California has deployed the equipment to Marine elements in Okinawa, and 2 units are being rotated with Marine combat units engaged in Operation Iraqi Freedom. This project resulted in an estimated \$68 million development cost avoidance, \$90 million in production cost savings, and \$27 million in operations and life-cycle cost savings.

High Rate-of-Fire .50 Caliber Machine Gun – Belgium – 2003



This project evaluated a cost-effective, high-rate-of-fire .50 caliber machine gun (M3M) manufactured by *FN Herstal of Belgium*, for employment on Marine Corps UH-1N and CH-53E helicopters to replace the obsolete .50 caliber machine gun currently in use. The FCT evaluation also assessed the gun for use on Air National Guard HH-60G rescue helicopters, integrated onto the External Gun

Mount System. The Marine Corps Warfighting Laboratory at Quantico, Virginia, managed the successful test program in conjunction with the Naval Air Systems Command at Patuxent River, Maryland, and the Marine Aviation and Tactical Squadron in Yuma, Arizona. In second quarter FY 2003, the Belgian weapon was added on an urgent basis to the Marine Heavy Helicopter (HMH) Squadron's CH-53 Super Stallion helicopters, giving them 180-degrees of defensive fire from the rear of the aircraft. In April 2003, HMH-461 deployed to Djibouti in support of Combined Joint Task Force Horn-of-Africa missions detecting, disrupting, and defending against trans-national terrorists. HMH 461 was the first Fleet Marine Force squadron to use the Belgian system in real-world operations. The FCT test program was completed successfully in third quarter FY 2004 and led to an initial procurement of 160 ramp-mounted weapon systems (including 184 M3M guns) totaling over \$8.9 million with options for 1,200 additional weapons for Marine CH-53, CH-46, and UH-1 helicopters.



Lightweight Aluminum Track for Expeditionary Fighting Vehicle – Germany – 1998

This project evaluated a lightweight aluminum track developed by *Diehl Reimscheid of Germany* for use on the Marine Corps' Expeditionary Fighting Vehicle (EFV). The objective was to provide the EFV program with the lightest production track available to achieve vehicle weight objectives. The FCT was executed by the Direct Reporting Program Manager, Expeditionary Fighting Vehicle (DRPM EFV) in Woodbridge, Virginia. The EFV prime contractor, General Dynamics Amphibious Systems, conducted a 3,000-mile durability test using the EFV Automotive Test Rig. Testing was also conducted at Aberdeen Test Center, Maryland, and Yuma Proving Ground, Arizona. Although the German tracks presented for evaluation did not test successfully, the German manufacturer proposed a "steel blocks" track variant with modifications to reduce the vibration and noise levels and improves durability. DRPM EFV is pursuing the procurement and testing of Diehl's "steel blocks" track with EFV program funds.



Lightweight Diesel-Driven Auxiliary Power Unit for Expeditionary Fighting Vehicle – Germany, United Kingdom (joint with Army) – 2000



This project evaluated lightweight high-speed diesel engine auxiliary power units (APU), developed by *Fischer Panda of Germany* for commercial marine industry application, and *Mid-West Engines of the United Kingdom*, for their suitability for employment in the Marine Corps' Expeditionary Fighting Vehicle (EFV). The objective was to qualify the APUs in a military environment, thereby significantly reducing the production costs for the EFV program. As this was a joint project with the Army the APUs, if qualified, were also to be considered for the Advanced Medium-Sized Mobile Power Systems Program. The German APU met or exceeded all test criteria in FY 2001; however, the British candidate did not meet power and output requirements and its testing was discontinued in late FY 2001. Endurance and noise tests were successfully completed at Fort Belvoir in fourth quarter FY 2003, and 3 of the German APUs were transferred as Government Furnished Equipment to the EFV prime contractor, General Dynamics Amphibious Systems, for System Development and Demonstration at the EFV Technology Center in Woodbridge, Virginia.

Skin and Open Wound Decontamination – Canada – 2001

This project successfully evaluated a Reactive Skin Decontamination Lotion (RSDL) developed by *O'Dell Engineering, Ltd.*, in service with Australian, Canadian, Dutch, and Irish military forces and medical personnel, to decontaminate skin, open wounds, and equipment. For the FCT evaluation, O'Dell teamed with *Curtiss Laboratories of Ben Salem, Pennsylvania*, and *Leominster, Massachusetts*, and *E-Z-Em, Inc., Long Island, New York*. The goal of the project was to assure that the lotion meets user requirements and achieves U.S. Food and Drug



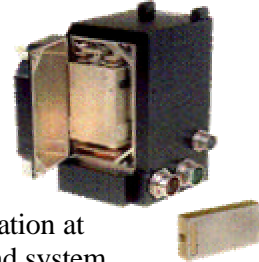
Administration approval. The Marine Corps Systems Command at Quantico, Virginia, conducted the test program in conjunction with the Army Medical Materiel Development Activity at Fort Detrick, Maryland; Aberdeen Test Center, Maryland; the Battelle Corporation in Columbus, Ohio; and Southern Research in Birmingham, Alabama. The Air Force medical community at the Human Systems Center at Brooks AFB, Texas, followed this evaluation, anticipating improvements in medical readiness. The FCT test program was completed in FY 2003 with the Canadian product demonstrating significant improvement in protection over the current M291 Skin Decontamination Kit. U.S. Food and Drug Administration approval for use was obtained in March 2003 with the sponsorship of the Office of the Army Surgeon General. Before authorizing the Marine Corps to procure and field RSDL, the Joint Program Executive Officer for Chemical Biological Defense (JPEO-CBD at Edgewood Arsenal, Maryland, directed that additional tests for the Joint Service Personnel/Skin Decontamination System (JSPDS) be conducted. A Milestone C (procurement) decision is expected upon completion of the additional tests.



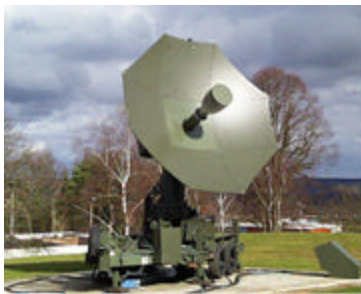
AIR FORCE

Airborne Video Recorder/Replay System – France – 2001

This project evaluated a state-of-the-art recorder/replay system developed by *Enertec of France* to determine if the French product would be a significant enough improvement over existing recorders to make it the standard video recorder for the Air Force Flight Test Center (AFFTC) flight test fleet. The French item is small, has large hard disk storage capacity and does not need external encoder/decoder units. The 412th Test Wing at Edwards AFB, California, managed the test program while the Global Power Fighter organization at the AFFTC conducted the flight test planning, test execution, data analysis, and system evaluation. The Enertec recorder failed on three consecutive flights and the test program was halted to determine the cause(s) of failure and to consider a possible solution. Sufficient data was available for the Program Office to conclude that the candidate system, in its tested configuration, would not meet the Air Force's requirements and the project was terminated.



Eagle Vision Sensor Upgrades – France – 2002

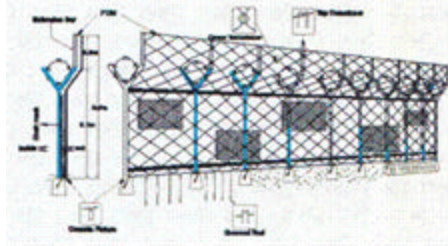


Eagle Vision is the Department of Defense's only deployable commercial satellite imagery receiving and processing ground station. This project evaluated the improvement in Eagle Vision performance achieved by incorporating 2.5-meter resolution imagery from the French SPOT 5 satellite. The use of the most advanced commercial imagery products in aircrew mission planning and rehearsal systems provides a dramatic increase in aircrew/aircraft survivability and mission effectiveness. The Air Force Electronic Systems Center at Hanscom AFB,

Massachusetts, conducted the test program. Eagle Vision, with an upgrade, was again deployed under Commander, U.S. European Command, tasking in third quarter FY 2004 and the SPOT 5 imagery was successfully collected and processed. In July 2004, the *European Aeronautic Defense and Space Company (EADS)* was awarded a contract valued at \$3.51 million to provide the SPOT 5 downlink capability to two Eagle Vision systems. In FY 2004, a follow-on FCT project was approved and funded by OSD to evaluate an additional upgrade to the Eagle Vision system to provide the capability to collect and process 3-meter resolution images from the Canadian Radarsat II (synthetic aperture radar) satellite produced by *Macdonald Dettwiler*. This later project, also managed by the Air Force Electronic Systems Center at Hanscom AFB, is continuing and is discussed elsewhere in this report. It is estimated that the successful SPOT 5 upgrade to the Eagle Vision system via the FCT Program resulted in a developmental cost avoidance of \$30 million, production cost savings of \$5 million and anticipated operational and life-cycle cost savings of approximately \$5 million.

Fiber-Optic Security Fence – Republic of Korea – 2002

This project evaluated an advanced perimeter security fence developed by *Zinus Corporation of the Republic of Korea* that continuously monitors laser pulses to detect and locate physical intrusion with high alarm reliability and a low false alarm rate. The system provides intrusion detection, requires minimal maintenance and can be placed on existing fences or walls or used as a stand-alone fence. There are currently nine commercial installations in Korea, including Incheon International Airport, Pusan Nuclear Power Plant, Incheon Reservoir, and the Seoul Communications Tower. The Air Force Electronic Systems Center, Force Protection Advanced Technology and Planning Program Office at Hanscom AFB, Massachusetts, conducted the test program with test support provided by the 46th Test Squadron at Eglin AFB, Florida. The candidate fence system was installed at the test site in FY2003 and tests were completed successfully in August 2004. The system was approved for U.S. Service use in November 2004. There have been no Air Force procurements to date.



Man-Portable Intrusion Detection System – United Kingdom – 2003



This project evaluated “Stealthguard,” a wireless surveillance system developed by *Sensor Electronics, Ltd of the UK.*, as a potential candidate for the “RAVEN KIT” aircraft protection requirement. The British system is comprised of palm-sized passive infrared detectors that are deployed from a briefcase-sized container and is used extensively by the Royal Air Force and British Constabulary. The sensor system has application to covert or overt high-value item protection, standoff perimeter approach

surveillance, area protection for security forces that are deployed, or in airbase ground defense operations. The Air Force’s Electronic Systems Center-Force Protection and C2 Program Office at Hanscom AFB, Massachusetts, conducted the test program with test support by the 46th Test Squadron, Eglin AFB, Florida, and the Air Force Operational Test and Evaluation Command detachment at Eglin. Stealthguard” was sent for several months to the 46th Test Squadron’s Cold Weather Test Site at Hancock Field, Syracuse, New York, in January 2004 where its operation was regarded as generally good; however, overall, the “Stealthguard” system did not meet Air Force force protection requirements as a stand-alone security sensor, and will not be procured.

Plastic Practice Bombs – United Kingdom – 1999

This project evaluated the BDU-61 sub-scale plastic practice bomb (PPB), manufactured by *Portsmouth Aviation of the UK*, for potential use on Air Force F-16, A-10, F-15, and B-52 aircraft in comparison with the current BDU-33 practice bomb. The objective of the project was to confirm the operational effectiveness of the candidate and its suitability to provide a dramatic improvement to the environmental and economic aspects of the cleanup of Air Force training ranges. The Air Logistics Command, Program Office for Paveway II and Bombs at Hill AFB, Utah, conducted the test program. Test results illustrated that the British candidate did not match the current ballistic profiles in the Operational Flight Programs of the airframes tested, and would not be procured and fielded.



Self-Regulating Anti-g Ensemble – Germany/Switzerland – 2002

This project evaluated an advanced liquid-filled Self-regulating Anti-G Ensemble (SAGE) manufactured by the Swiss-German joint venture *Autoflug Libelle GmbH of Germany and Switzerland*, potentially a major breakthrough in “g protection.” Gravity-induced loss of consciousness plagues fighters at levels above 6g, and current equipment limits crews from achieving and maintaining sustained high-g maneuvers without significant risk and fatigue, often limiting aircraft from full operational capability. The Air Combat Command, Human Systems Integration Division, at Langley AFB, Virginia, conducted the test program with test support from the 53rd Test and Evaluation Group at Eglin AFB, Florida, the Air Force Research Laboratory Biodynamics and Acceleration Branch at Wright Patterson AFB, Ohio, and the 311th Human Systems Wing at Brooks AFB, Texas. The main flight evaluation portion of the project, focusing on operational effectiveness and suitability, was completed at Eglin AFB in fourth quarter FY 2003 with generally positive results; however, it was determined that the SAGE required additional study prior to certification for fielding. Tests were conducted in FY 2004 to resolve the issues precluding Air Force certification of the Libelle suit. Tests indicated that the SAGE, used in combination with the modified SAGE Straining Maneuver (SSM), afforded a level of g-protection comparable to the Standard COMBAT EDGE flight suit, but less than that provided to pilots wearing COMBAT EDGE/ATAGS (Advanced Technology Anti-g Suit). Based on these results the SAGE tested in the FCT project would not be procured as there was no significant improvement in g-protection.

**U.S. SPECIAL OPERATIONS COMMAND****7.62mm Lightweight Machine Gun – Belgium – 2002**

This project evaluated a lightweight 7.62mm machine gun manufactured by *FN Herstal of Belgium* to potentially replace the 7.62mm MK43 machine gun in the Naval Special Warfare (SEAL) inventory. A domestic candidate, a modified MK43 presented by General Dynamics Armament Systems of Burlington, Vermont, was also



evaluated. The project was sponsored by the U.S. Special Operations Command and the Program Manager for Naval Special Warfare at the Naval Sea Systems Command in Washington, D.C. . Procurement decisions were completed in March 2003 and a production contract was awarded to FN Herstal for up to 2,500 weapons. To date 492 weapons (designated the MK48 MOD0) valued at \$3.74 million have been procured. As a result of the non-developmental acquisition approach and accelerated schedule of this project, an estimated \$6.4 million in development cost avoidance was achieved, as well as production cost savings approximating \$600,000.

Advanced Demolition Weapons – Germany, Sweden – 2001



This project evaluated shoulder-fired weapons that can be employed from confined spaces in order to satisfy a range of Special Operations Forces missions, including Military Operations in Urban Terrain, anti-armor, and direct engagement of targets from protected/covered areas. The “Bunkerfaust,” presented by *Dynamit Nobel/Diehl of Germany*, and the *Swedish Saab Bofors Dynamics AT-4CS (Confined Space)*

were tested. The Army’s Armament Research, Development and Engineering Center at Picatinny Arsenal, New Jersey, directed the FCT project with technical involvement by Aberdeen Test Center, Maryland, Yuma Proving Ground, Arizona, and the Naval Surface Warfare Centers at Crane, Indiana, and Indian Head, Maryland. The German weapon performed satisfactorily; however, the vendor’s procurement cost proposal did not meet the project down-select criteria and the weapon was not currently in production. As a result, evaluation of the German candidate was discontinued. Test objectives were met for a U.S. configuration of the Swedish AT-4CS weapon meeting fuze and insensitive munitions requirements. In January 2002, as a result of this successful FCT, 168 AT-4CS-HP (High Penetration) weapons valued at \$248,000 were procured on an urgent basis for Special Forces. This was the first fielding of a confined space shoulder-fired system to U.S. Forces. A second urgent buy was made in July 2003 for 600 AT-4CS-RS (Reduced Sensitivity) systems valued at \$1.44 million for Army use in Afghanistan and Iraq. In September 2003, Special Forces made a third procurement of 2,024 AT-4CS-RS systems valued at \$5.82 million. As of March 2005, a total of 6,242 AT-4CS weapons (both HP and RS) valued at \$15.9 million have been procured. Type classification of the AT-4CS-RS for the Army is underway. An estimated \$25 million in development cost avoidance was achieved, as well as production cost savings approximating \$5 million and anticipated operations and life-cycle cost savings of \$2 million.



Advanced Lightweight Grenade Launcher Ammunition (ALGL-A) – Germany, Norway, Sweden – 1999

This project evaluated air-bursting ammunition manufactured by the *Nordic Ammunition Company of Norway (NAMMO)*, with support from *Diehl of Germany* and *Saab Bofors Dynamics of Sweden*, for use in USSOCOM’s Advanced Lightweight Grenade Launcher acquisition program. The candidate ammunition promised the capability to engage targets in defilade positions or urban areas. The entire ALGL-A program



was delayed due to consolidation of the principal Scandinavian manufacturing sources and problems with the original European source of safe and arming (S&A) assemblies for the ammunition. Sample rounds were not delivered until 2004, at which time the test program was initiated with unsatisfactory results achieved. In late FY 2004, the test hardware provided by NAMMO was determined to be unsafe for testing and the FCT project was discontinued. Procurement of the NAMMO MK285 ammunition will only proceed after successful testing of a re-design by NAMMO and demonstration of the safety and reliability of the proposed solution. USSOCOM intends to leverage the investment of the FCT project by supporting test costs for redesigned MK285 cartridges as the sole means to address the user’s requirement for 40mm air-bursting ammunition for the ALGL system.

Body Armor Flotation Vest – United Kingdom – 2003

This project evaluated an inflatable body armor system developed by *International Safety Products of the United Kingdom*, with the goal of integrating the technology into the present Body Armory Load Carriage System (BALCS) used by today's Special Operations Forces. The British system is in service and protects against bullets and fragmentation while providing the wearer with increased range of movement and comfort. The Special Operations Forces Special Projects Team at the Army's Natick Soldier System Center in Massachusetts managed the FCT test program, completed in first quarter FY 2004. The British vest did not perform to threshold requirements during a series of tests conducted by the Special Forces Underwater Operation Course in the Florida Keys during fourth quarter FY 2003, and with West Coast Navy Special Warfare (SEAL) units in Coronado, California. As a result, the FCT project was discontinued.

Body-Worn Radar Detection Receivers – United Kingdom – 2003

This project evaluated commercially-available radar warning receivers developed by *Filtronic Components, Ltd.*, *Spectrum Solutions*, and *QinetiQ of the United Kingdom*, to determine if they could provide critical threat warning and situational awareness to meet Special Forces requirements. The Joint Threat Warning Systems Program Office at MacDill AFB, Florida, conducted the test program with technical evaluation support from the Navy's Space and Naval Warfare Systems Center in Charleston, South Carolina, and the Pennsylvania State Applied Research Laboratory, State College. The systems' sensitivities were reportedly equal to or better than proven shipboard systems used aboard MK-V special operations craft. A production decision was reached in the first quarter FY 2005 on behalf of the Joint Threat Warning System, Ground Signals Intelligence Kit (GSK) Program, with the QinetiQ capability (once ruggedized) receiving approval to be integrated into GSK variants. Contract actions are expected to be initiated as soon as the overall GSK Increment II configuration is solidified. Additional systems will be procured from the participating vendors for use in an ongoing Manpack Advanced Concept Technology Demonstration (ACTD) led by the U.S. Special Operations Command and funded by the Deputy Under Secretary of Defense Advanced Systems and Concepts.

Fly-Away SATCOM (Satellite Communications) System– Sweden – 2003

This project evaluated two sizes of small, lightweight satellite communications dishes developed by *SWE-DISH of Sweden* for one-person operations in a turnkey solution, providing a unique capability to transmit and receive secure communications (live video/audio streaming, broadband transmission and automated setup) without sacrificing the identity or location of the user. The Joint Threat Warning Systems Program Office and Legacy Force Protection Systems Office at MacDill AFB, Florida, conducted the test program in conjunction with the SATCOM Laboratory of the Space and Naval Warfare Systems Center in Charleston, South Carolina; test elements at Fort Bragg, North Carolina; at the DISA facility at the Army's Communications-Electronic Command in Fort Monmouth, New Jersey; and at the Georgia Institute of Technology in Atlanta, Georgia.



All testing was successfully completed in April 2004. The SWE-DISH .9M IPT suitcase is the first earth terminal of its type, and one of a very few antennas of its size to receive Eutelsat type approval. Under the Global Satellite Users Agreements, approval from Eutelsat signifies that the .9M suitcase is authorized for world-wide usage on any satellite vendor's system. This FCT undertaking has been established as a program of record termed the "Compact Broadband Remote Antenna (CoBRA) Program," with numerous systems deployed in support of various Department of Defense Services and Agencies. As a result of this FCT project there have been procurements of over 103 systems DoD-wide valued at approximately \$23 million, an estimated \$8 million in development cost avoidance was achieved.

Gunfire Detection System – France – 1999

PILAR, manufactured by *Metravib of France*, is an acoustic detection system that determines azimuth, elevation, and range from a registered point to the origin of a shot. The original objective of this project was to evaluate the item for an urgent requirement identified by the U.S. European Command: to field the system with Army units to counter sniper fire during operations in Bosnia and Kosovo. In early FY 2000, the U.S. Special Operations Command assumed responsibility for project execution.

During the same period, 8 systems were deployed to Kosovo. Subsequently, the Metravib system underwent further testing in tropical and urban environments to achieve full military type classification. An additional 52 systems (including fixed site and mobile/vehicle variants) worth approximately

\$3.6 million were procured in FY 2001 to provide an interim operational capability. All testing was completed in FY 2003, with the PILAR system performing well. Fielding and deployment of PILAR was authorized in third quarter FY 2003. Ten units each of fixed-site and vehicle-mounted variants were immediately deployed to Iraq for use by the 101st Airborne Division. In fourth quarter FY 2004, three fixed-site systems and three Versatile Observation Turrets (picture at right) were fielded with Marine Corps combat units in Iraq. Delivery of additional systems and training for the receiving combat units is continuing into FY 2005, with a total of 77 fixed-site and 66 vehicle-mounted systems deployed to date in Iraq and other theaters with a value of about \$15 million. As a result of this successful FCT project, an estimated development cost avoidance of \$5 million was achieved. In addition, the U.S. Special Operations Command/Army Research Laboratory project manager for this FCT was selected as the 2004 Civilian Tester of the Year by the National Defense Industrial Association (NDIA). Illustrative of the improved capabilities provided by the system in current operations is the after-action report from a member of the 116th Brigade Combat Team in April 2005 in Kirkuk, Iraq: ***"Rounds were fired by insurgent snipers at our guys. The gunfire detection system performed as advertised and identified the distance and bearing of the fire. Our search of the location resulted in the capture of the insurgents and their weapons. None of our men were injured. Thanks so much for getting this system and training to us. Catching the bad guys equates to saving lives."***



Man-Portable Multi Sensor System Headsets and Sensors – Denmark, France, Israel, Sweden, United Kingdom – 2001



This project evaluated lightweight, hand-held or portable sensors, developed by *Metravib of France*, and *FLIR Systems and EXENSOR of Sweden*, to meet requirements of the Joint Threat Warning System (JTWS). The sensor candidates promised capabilities including all-weather detection of ground and air vehicles and maritime and river vessels. As part of this FCT, specialized headsets, receivers, and related components developed by *Source of Sound of Israel*, *NextLink of Denmark*, *Sordin of Sweden*, and *Racal/Davies of the United Kingdom* were evaluated for compatibility with Special Forces communications equipment and specialized personnel equipment. The headsets provide a ruggedized waterproof communications capability. The Army Research Laboratory in Adelphi, Maryland, managed the technical effort on this project in coordination with the Joint Threat Warning Systems and Legacy Force Protection Systems offices at MacDill AFB, Florida; the Army's Natick Soldier Systems Center in Massachusetts; and the Airborne Special Operations Test Directorate at Fort Bragg, North Carolina. Testing of the headset candidates was successfully completed in June 2003, and a contract worth \$5 million was awarded to Television Equipment Associates of Brewster, New York, to integrate the Israeli Source of Sound Eagle Headset and Danish NextLink Invisio Bone Mike into the Special Forces Maritime Communications System. Contracts were also awarded to Source of Sound and NextLink for their products for the integration effort. Of the sensors tested, the Swedish FLIR Systems' MilCAM Recon infrared camera and the Metravib PILARMAN surveillance detector have the best potential of meeting Special Forces requirements. Additional units have been purchased for further testing and possible integration into the Special Forces' PILAR Gunfire Detection System and other Special Forces sensor programs.

MC-130H Aerial Refueling System Pod – United Kingdom – 1999

This project evaluated an advanced aerial refueling pod and drogue developed by *Flight Refuelling Limited of the UK* to determine its operational suitability for the MC-130H Combat Talon II aircraft. The wing-mounted system can refuel slow helicopters and faster tilt-rotor aircraft during a single mission and provides a new, unique capability and preplanned product improvement for the aircraft that is being pursued by the Boeing Aircraft Company. The Air Force Materiel Command at Wright Patterson AFB, Ohio, conducted the development, integration, and test program. After a successful limited evaluation, full qualification and integration of the MK32B-902E into the MC-130H aircraft was initiated in FY 2002. The overall FCT project was successful. U.S. Special Operations Command decided in March 2004 on a Low Rate Initial Production and a first contract option to Flight Refuelling Limited for eight MK32B-902E pod pylon assemblies and long lead kits valued at \$7.2 million. Full Rate Production was authorized in June 2004 and options were exercised for up to 64 additional units valued at \$55 million for delivery in the FY04-07 timeframe. Flight Refuelling Limited and Boeing have jointly created a repair and support facility at Fort Walton Beach, Florida, to provide depot level maintenance of the pods/pylons. The "MCARS" FCT project achieved an estimated \$40 million in development cost avoidance and 1 year accelerated fielding time.



Parachute Leaflet Delivery System – Canada – 1999

This project successfully evaluated a Leaflet Delivery System (LDS) developed by *Mist Mobility Integrated Systems Technology (MMIST)* of *Nepean, Ontario*, against the Wind-Supported Air Delivery System (WSADS) requirement to provide safer and more accurate delivery of psychological operations leaflets. Current leaflet delivery methods require risky manual dumping over targets at low altitudes, exposing U.S. aircraft and crews to increasingly complex threats during other-than-war operations and low-intensity conflicts. The Canadian “Snow Goose” system provides precision-guided autonomous waypoint

navigation and pinpoint delivery over long distances and high altitudes. Performance and initial operational tests were conducted in FY 2002 at Yuma Proving Ground, Arizona, and at the Army Soldier Biological and Chemical Command at Natick, Massachusetts. Follow-on ground-launch and air-launch tests were completed successfully in April and May 2003 at Yuma Proving Ground. The Snow Goose met or exceeded all WSADS performance specifications and LDS performance parameters. Based on the successful FCT test program, two Snow Goose platforms, ancillaries, and operational spares valued at \$841,000 were procured in December 2003. In February 2004, the procurement of up to 22 Full Rate Production WSADS Operational Sets totaling \$9.89 million was authorized, and MMIST was awarded a contract for 8 Snow Goose systems with delivery in FY 2004. Future plans call for procurement of 74 Snow Goose systems with a total contract value in excess of \$26 million. An estimated \$20 million development cost avoidance resulted from this FCT project, based on the expected cost to develop an unmanned aerial vehicle with the performance capabilities of the Snow Goose. The WSADS LDS variant Snow Goose is also being used as the baseline air platform for an ongoing Advanced Concept Technology Demonstration (ACTD) led by the U.S. Special Operations Command and funded by the Deputy Under Secretary of Defense (Advanced Systems and Concepts).

Semi-Rigid Ammunition Container for MK48 7.62mm Lightweight Machine Gun – Belgium – 2004

This project evaluated a semi-rigid ammunition container developed by *FN Herstal of Belgium* for the MK48 Lightweight Machine Gun, an organic weapon used by U.S. Special Forces Teams. The container increases weapon reliability by protecting the ammunition while operating in harsh environments such as surf zones. The container also provides for a better balanced weapon due to mounting under the centerline, providing greater operational suitability for patrollers. The project was conducted by the Naval

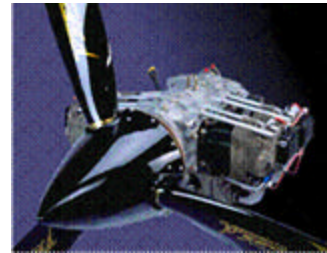
Surface Warfare Center, Crane, Indiana. The first Low Rate Initial Production items were delivered and fielded with Special Forces units in December 2004. The decision to proceed to Full-Rate Production was made in first quarter FY 2005. Cost savings are being realized due to the community of different caliber ammunition containers applicable to the Belgian design. The successful project achieved an estimated development cost avoidance of \$100,000.

Stand-Alone Cooling Suit – Canada, France, United Kingdom – 2002

This project evaluated lightweight cooling suits designed to regulate body temperature of Special Force personnel operating in environments with elevated temperatures or when wearing chemical protective garments. The candidates are manufactured by *MedEng of Canada*, *Eurodefhi of France*, and *W.L. Gore, Ltd. of the United Kingdom*. The Special Forces Office at the Army's Natick Soldier Center in Massachusetts conducted the tests from November 2002 to April 2004. Initial determination was that the cooling performance, duration and weight of ice, dry ice, or liquid air systems presented for evaluation would not be sufficient to maintain core body temperature requirements; however, the FCT project identified that the "Shortie" liquid-circulating garment manufactured by MedEng of Canada had potential to meet requirements. As a result, the U.S. Special Operations Command initiated a Small Business Innovation Research (SBIR) effort to develop a vapor compression cooling unit for the liquid-circulating garments that were tested in this project.

**Ultra Light Aero Diesel Engine (ULADE) – United Kingdom – 2003**

This project tested foreign heavy fuel engines for powered para-foils for air drop survivability and capability for operations at altitudes up to 20,000 feet. Following a technical evaluation of several candidates, a promising engine developed by *Diesel Air Limited of the United Kingdom*, the DAIR 100, was down-selected. The initial effort was to evaluate the British engine for integration into the powered para-foil associated with the Leaflet Delivery System Unmanned Aerial Vehicle-Wind Supported Air Delivery System then under FCT evaluation by the U.S. Special Operations Command. The DAIR-100 ULADE did not meet required performance parameters for this application and will not be procured. In first quarter FY 2005, management of the ULADE effort was transferred to the Office of the Deputy Under Secretary of Defense (Advanced Systems and Concepts) with the intention of testing another foreign-developed engine from Thielart of Germany under the ongoing Global Reach Advanced Concept Technical Demonstration (ACTD).

**Wireless LAN (Local Area Network) Monitoring System – New Zealand – 2003**

This project evaluated a lightweight wireless LAN monitoring system, "CommView", developed by *TamoSoft of New Zealand*, to meet Special Forces' requirements for the Joint Threat Warning System (JTWS). The JTWS Program Office at MacDill AFB, Florida, conducted the test program with support by the Navy's Space and Naval Warfare Systems Center in Charleston, South Carolina, and Pennsylvania State University Applied Research Laboratory. Results were positive and included a comparison of the TamoSoft system to systems currently in use. Based on the evaluation team's recommendation, a production decision was reached in the first quarter FY 2005 on behalf of the JTWS-Ground Signals Intelligence Kit (GSK) Program, with the CommView Worn and Man-Packable Wireless LAN components being approved to be integrated into GSK variants. Contract actions are expected as soon as the overall GSK Increment II configuration is solidified.



CONTINUING AND NEW FY 2003 and 2004 PROJECTS**Table 4. Continuing and New Start Fiscal Year 2003 and 2004 Projects**

Sponsor	Project
Army	105mm Preformed Fragments – 2003 120mm Mortar Propellant – 2004 155mm Ammunition – 2003 Celluloid Mortar Increment Containers – 2004 Large Scale Display System – 2004 Laser Obstacle Detection System (joint with USSOCOM) – 2002 Lightweight Smoke Generator – 2004 Lithium Ion Battery Cells – 2004 Regenerative Drive System – 2004 Small Bundle Resupply System – 2003
Navy	Digital Flight Control System for EA -6B “Prowler” – 2002 High Frequency Adaptive Antenna Receive System Replacement – 2002 High Temperature Protective Coatings for Gas Turbine Engines – 2003 Improved Specific Emitter ID System – 2003 MARIA Mapping Application (Tactical Geographic Information System) – 2001 Mine Countermeasures Small Unmanned Underwater Vehicle – 2004 Mobile Acoustic Support System – 2004 Naval Active Intercept and Collision Avoidance System – 2004 Pitch-Adapting Composite Marine Propeller – 2004 Replacement Structures for Aircraft – 2003 Resilient Abrasive-Resistant Skirt for Landing Craft Air Cushion (LCAC) – 2002 Shipboard Anti-Jam GPS Antenna – 2003
Marine Corps	40MM High Explosive Dual Purpose (HEDP) Improvement - 2004 Deployable Instrumentation for MAGTF Training – 2003 Deployable Multi-Purpose Moving Target System - 2004 Eye-safe Laser Rangefinder for M1A1 BattleTank – 2003 Floating Smoke Pot System – 2001 JSLIST Alternative Footwear Solution (Protective Boot) – 2004 JSLIST Block II Glove Upgrade - 2004 Lightweight Prime Mover for 155MM Towed Howitzer – 2004 Mounted Cooperative Target Identification System - 2004 NBC Integrated Footwear System (Protective Sock) – 2002 Remote Control System for Assault Breacher Vehicle – 2004 Special Effects Small Arms Marking System – 2003
Air Force	20mm Replacement Round – 2004 Guidance Components for Missiles – 2004 MEMS Inertial Measurement Units – 2004 Missile Reserve Battery Replacement – 2003 Radarsat II Commercial High Resolution SAR – Canada – 2004 Rayon for Heatshield and Motor Nozzles – 2003 Wideband Klystron for E-3 AWACS – 2000
USSOCOM	40mm Enhanced Grenade Launcher for M4 Carbine – 2003 Advanced Family of Interfaces for Chemical-Biological Clothing – 2004 Deployable GSM Cellular Network – 2004 Global Cellular Phone System Optimization – 2003 Low Probability of Intercept Communications Intelligence Direction Finding – 2004 MAAWS Illumination Round – 2001 SOF Combat Rifle – 2004 Traveling Wave Tube Amplifier – 2004



ARMY

105mm Preformed Fragments – Republic of South Africa – 2003



This project is assessing conventional 105mm field artillery ammunition developed by *Denel-Naschem of South Africa* for potential increased lethality and range compared to current U.S. 105mm ammunition. The South African ammunition is reported to have greater lethality than the U.S. 155mm M107 projectile. The Army's Product Manager for Combat Ammunition Systems (PM-CAS) is conducting the test program at Yuma Proving Ground, Arizona; Aberdeen Test Center in Maryland, and Picatinny Arsenal in New Jersey. The test program contract was awarded to Denel-Naschem and its U.S. partner, *General Dynamics Ordnance and Tactical Systems (GDOTS) of St. Petersburg, Florida*, in third quarter FY 2003. The results of initial field testing conducted at Yuma Proving Ground in fourth quarter FY 2004 were in accord with expectations, with lethality equal to the U.S. M155mm ammunition and range greater by 3-4 kilometers than the U.S. M105mm M1 projectile from the same M109 howitzer. In December 2004, Denel-Naschem/GDOTS began ammunition design modifications in preparation for type classification testing later in 2005. Testing is proceeding as planned and a type classification decision is scheduled during FY 2005. If the project is successful, these rounds will be procured with Army Artillery ammunition funds, beginning in FY 2006.

120mm Mortar Propellant – Switzerland – 2004



This project is evaluating a high-performance Extruded-Impregnated (EI) propellant for long-range mortar systems developed by *Rheinmetall/Nitrochemie Wimmis AG of Switzerland*. The FCT qualification of EI propellant will support the Army's Future Combat System requirements for increased range, eliminate use of a hazardous/toxic stabilizer, reduce blast overpressure, increase rate of fire, decrease gun tube wear, and increase propellant shelf life. The project is being conducted by the Army's Armaments Engineering and Technology Center at Picatinny Arsenal, New Jersey, at Picatinny Arsenal, and at the Yuma Proving Ground in Arizona. The scope of the test program was expanded for FY 2005 to evaluate the same propellant for use in the mortar igniter (primer). Testing is scheduled to continue through FY 2006.

155mm Ammunition – Republic of South Africa – 2003

This project evaluates the potential increased range of the Assegai family of 155mm field artillery projectiles developed by *Denel-Naschem of South Africa*, compared to current U.S. 155mm ammunition. If successful, the project will greatly increase the fire support provided to U.S. Army ground forces. The Army Product Manager for Combat Ammunition Systems (PEO-AMMO/PM-CAS) is conducting the test program at Yuma Proving Ground, Arizona; Aberdeen Test Center in Maryland; Dugway Proving Ground, Utah; and Picatinny Arsenal, New Jersey. The test program contract was awarded to Denel-Naschem and its U.S.



partner, *General Dynamics Ordnance and Tactical Systems (GDOTS), St. Petersburg, Florida*, in third quarter FY 2003. The results of these tests to date meet expectations with improved

lethality, improved screening, improved visibility, and range 3 kilometers greater than the U.S. M795 projectile fired from the same M198 Howitzer. Planning is in progress for type classification testing in 2005. If successful, these rounds will be procured with Army Artillery ammunition funds in FY 2006.

Celluloid Mortar Increment Containers– Austria – 2004

This project is evaluating foreign celluloid mortar increment containers as a second source for the nitrocellulose-based belted-fiber Mortar Increment Containers (MIC), used to contain and protect propulsion charge systems in 60mm, 81mm and 120mm mortars. *Kaufman & Gottwald (KAGO) GmbH of Austria* is a world leader in celluloid material fabrication. Qualification of KAGO as a second source of celluloid MICs will significantly reduce U.S. production costs and improve the durability of propulsion charge systems for semi- and auto- loading capabilities required for the Army's Future Combat System. The Warheads, Energetics and Combat Support Armaments Center (WECAC), Army Research, Development and Engineering Center at Picatinny Arsenal, New Jersey, will be conducting the test program at Yuma Proving Ground, Arizona. The test article contract was awarded to KAGO in April 2004. Certification of the Austrian celluloid MIC tooling and manufacturing process was completed in first quarter FY 2005. Testing will continue through FY 2005.



Large Scale Display System - Republic of Korea – 2004



This project is evaluating very high-resolution Flat Panel Screen Displays developed by *Samsung Electronics of the Republic of Korea* for potential to satisfy Army battlefield command and control (C2) requirements, with applications in Standard Integrated Command Posts (SICP) and PM Tactical Operations Centers (PM-TOC). Successful evaluation and fielding will allow the commander and staff to view various applications in a high-resolution environment. The Army's Product

Manager for Common Hardware/Software Systems (CHS), Communications-Electronics Command at Fort Monmouth, New Jersey, is conducting the test program at the Command and Control Directorate's (C2D) Advanced Display Laboratory at Fort Monmouth. Follow-on testing is planned at the Central Technical Support Facility at Fort Hood, Texas. Results of tests to date are positive. A display will be selected for the Battalion echelon command post in third quarter FY 2005 and, after being ruggedized, will undergo First Article Test exercises with the 4th Infantry Division at Fort Hood.

Laser Obstacle Detection System – Germany (joint with U.S. Special Operations Command) – 2002

The *European Aeronautic Defence and Space Company (EADS)-Dornier Group of Germany* developed a Helicopter Laser Radar (Hellas) that promises to improve aircrew avoidance of hazardous obstacles by providing detection, processing, and warning of imminent aircraft safety hazards. The Hellas system is in use by the German Border Patrol. This project is evaluating the characteristics of the Hellas system, its suitability for integration on Army and Special Forces aircraft



platforms, and its ability to satisfy tactical operational requirements for obstacle avoidance. The Army Communications and Electronics Command, Night Vision and Electronic Sensors Directorate at Fort Belvoir, Virginia, has been leading a successful joint Army-U.S. Special Operations Command program team in this effort. The Army originally planned to close out its portion of this project near the end of FY 2004 and transition primary cognizance to the U.S. Special Operations Command, reserving project decisions until the Special Operations segment was complete. However, the Army Program Executive Officer for Aviation (PEO-Aviation) has expressed renewed interest in an Obstacle Avoidance-Cable Warning system as a direct result of a deadly helicopter crash in November 2004 at Fort Hood, Texas, with fatalities to a General Officer and six Soldiers. Accordingly, the Army will continue to monitor PEO-Aviation and Special Operations Command's actions on this project.

Lightweight Smoke Generator – Poland – 2004



This project is evaluating a camouflage smoke generator (CSG) developed by *PZL Rzeszow of Poland* that is significantly lighter than the U.S. Army's M56 system. A key aspect of the Polish system is its combination of fog oil and infrared obscuring particles in one solution to provide visual/infrared obscuration, in contrast to the M56 system which uses additional components to separately disseminate fog oil and graphite. If the project is successful, significant weight reduction could be achieved. After the project was approved, the Army Acquisition Objective for the M56 Smoke Generating System was changed from a requirement for 1,016 to 241 systems, and it was estimated that the Polish CSG technology may have a role in providing smoke generating capability for the Future Force. Once the Polish equipment is made available, it will be tested at the Aberdeen Proving Ground-Edgewood Area test facilities in Maryland. Much of the first year of this project has been spent on efforts, still in progress, to acquire the smoke generator. In the meantime, a contract was awarded to *Unitronex Corporation, Saint Charles, Illinois*, in fourth quarter FY 2004, for the purchase of test quantities of the Polish obscuring liquid, and an evaluation was initiated at Edgewood in the first quarter of FY 2005.

Lithium-Ion Battery Cells – Republic of Korea, United Kingdom – 2004

This project is evaluating the potential for Li-Ion battery cells developed by *SKC of the Republic of Korea* and *AGM Batteries, Ltd. of the United Kingdom* to satisfy Army portable electrical power requirements for a high-energy density, high- cell potential fuel source. The candidates may provide greater energy than present Li-Ion cell-based batteries. They have the potential to reduce the logistics burden and enhance cost effectiveness through increased mission times, greater shelf life, increases in power, and greater recharging capability. The project is being conducted by the Army's Communications and Electronics Research, Development and Engineering Center, Command and Control Directorate, at Fort Monmouth, New Jersey. AGM and SKC cell testing was successful. Results suggest that batteries made from the individual cells will surpass the current Li-Ion batteries. Prototype battery assemblies began delivery in fourth quarter FY 2004, and the second phase of



the FCT project, including life-cycle testing, was initiated. Prototype BB-2600/U and BB-2800/U batteries assembled with the AGM cells were tested. Initial results show that both battery types surpassed the performance specifications and performance of the same batteries currently being procured. The project is continuing on schedule into FY 2005. Based on the successful evaluation of the prototype batteries, the Army's Logistics Readiness Center will complete the required activities to incorporate the batteries into the Army logistics pipeline.

Regenerative Drive System – Australia – 2004



This project is evaluating the capability of a hydraulic hybrid technology developed by *Permo-Drive Technologies Ltd of Australia* to recycle wasted power during deceleration of large vehicles, such as the Army's Family of Medium Tactical Vehicles (FMTV). The

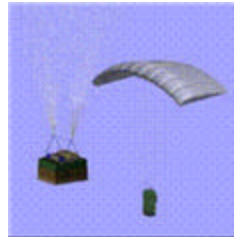


Australian technology, which is easily retrofitted to most military truck platforms, captures braking energy, stores it in the form of hydraulic pressure, and releases it to enhance dash capability and fuel economy while improving braking performance and brake life. The project is being conducted by the Product Manager for Medium Tactical Vehicles, Tank Automotive and Armaments Command at the Army's National Automotive Center in Warren, Michigan, and at the Aberdeen Test Center in Maryland. The test program at Aberdeen Test Center began in April 2005 and is expected to be completed by September 2005.

Small Bundle Resupply System – Canada, Republic of Korea, Netherlands – 2003

This project is evaluating compact guidance and control units developed by the following three competing vendors: *MMist of Canada*; *Koable of the Republic of Korea*; and *Dutch Space of the Netherlands*, as alternatives to the Parafoil Aerial

Delivery System – Extra Light. If successful, the project will provide extremely precise high-altitude delivery of small bundles and airborne troops for missions such as re-supply for military operations in urban terrain, delivery of small robots and sensors, counter-terror operations, and humanitarian support missions. The Air Drop/Aerial Delivery Directorate of the Army's Natick Soldier Center in Massachusetts is conducting the test program at Yuma Proving Ground, Arizona, and the Red Lake Drop Zone in Kingman, Arizona. A Cooperative Research and Development Agreement (CRADA) was established with Dutch Space of the Netherlands, the company not selected for the FCT Program, in order to investigate their technology further. The latest tests of the Canadian and Korean systems were conducted in March 2005. Tests are expected to be concluded in FY 2005.





NAVY

Digital Flight Control System for EA-6B – United Kingdom – 2002



This project is evaluating a digital flight control system (DFCS) developed by *BAE Systems Avionics Ltd of the UK* for the Eurofighter and Typhoon aircraft to replace the increasingly obsolete automatic flight control system in the Navy's EA-6B "Prowler" aircraft. The project follows successful integration of the BAE DFCS into the Navy's F-14 "Tomcat" aircraft as a result of a previous successful FCT undertaking. The British system holds promise to prevent losses of the

DoD's only standoff electronic jamming aircraft through spurious inputs from the current analog system. The Program Manager for EA-6B (PMA-234) is conducting the test program at the Flight Dynamics Laboratory, Naval Air Warfare Center, at Patuxent River, Maryland, in coordination with their Engineering Flight Controls and System Safety Branches. In October 2004, the unrestricted Block-89A aircraft 158804, designated as the FCT project's flight test asset, landed at Patuxent River. Flightworthy prototype DFCC test articles were delivered in November and BAE's contract option II to manufacture production representative Digital Flight Control Systems for the EA-6B was exercised in December. Phase I ground testing was also completed in December. The project is continuing with good results.

High Frequency Adaptive Antenna Receive System Replacement – Canada – 2002

High Frequency Adaptive Antenna Receive System Replacement – Canada – 2002



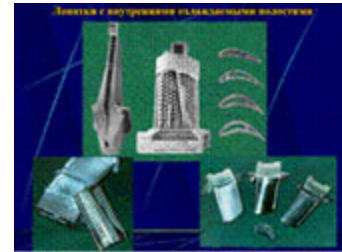
This project is evaluating a high-frequency adaptive antenna system developed by *SED Systems, Saskatoon, Saskatchewan*, to meet a Navy requirement to improve the quality, range, and anti-jam performance of Link-11 ANDVT secure voice and HF radio communications with maritime patrol and surveillance aircraft. The Space and Naval Warfare Systems Center in Charleston, South Carolina, has conducted the test program in coordination with Commander, Naval Patrol and Reconnaissance Forces, Atlantic and Pacific Fleets. A test article contract was awarded to SED Systems in January 2002. Three systems, inclusive of the test article, have been procured. Software related issues

in final operational tests resulted in a decision to place future procurements on hold. No follow-on procurements are anticipated at this time.

High-Temperature Protective Coating for Gas Turbine Engines – Canada, Russian Federation – 2003



This project is evaluating the benefits to the operational life of gas-turbine engine hot section components achieved from application of protective coatings presented by *MDS-PRAD Technologies* (*Ural Works of Civil Aviation (PRAD)* of



Russia and *MDS Aerospace Corporation of Canada*), a joint venture company established at Prince Edward Island, Canada. This effort is a follow-on to the successful FCT Program certification of the MDS-PRAD coating process for gas turbine compressor blades in H-53 Sea Stallion helicopter T64 engines, which is transitioning to several other naval weapon systems, including H-46 Sea Knight, P-3C Orion, and AV-8B Harrier aircraft for operations in Enduring Freedom and Iraqi Freedom. The project is being conducted by the Propulsion and Power Engineering Department (AIR 4.4) and the Harrier F402 Engine Team, Naval Air Systems Command at Patuxent River, Maryland, with support from the Naval Engine Airfoil Center at Cherry Point, North Carolina; the Naval Research Laboratory, Washington, D.C.; Rolls Royce, the F402 engine prime; the National Aeronautics and Space Administration; and the University of Pennsylvania Applied Research Laboratory College Station.

Improved Specific Emitter Identification System– United Kingdom – 2003



This project is evaluating National Security Agency (NSA)-compliant technology alternatives, developed by *QinetiQ of the UK*, as compared to the U.S. specific emitter identification processors currently in Navy use for passive identification and fingerprinting of emitters in naval applications. The Space and Naval Warfare Systems Center in San Diego, California, is conducting the test program with technical test support from the Navy's Center for Naval Analyses. Both maritime and land-based emitters are being used to determine the capabilities of the British system. From April through June 2003, laboratory tests were completed at Applied Power Technologies Inc., Columbia, Maryland, maritime tests were accomplished by the Naval Research Laboratory, Chesapeake Bay Detachment, and land-based testing

was conducted at the China Lake Electronic Combat Range in Ridgecrest, California. Integration work is continuing to ready the British system for environmental testing which is planned for later in FY 2005.

MARIA Mapping Application (previously named Tactical Geographic Information System-Maria) – Norway – 2001

This project is evaluating a software-based command and control system developed by *Teleplan AS of Norway* that provides superior battle-space awareness through the rapid display of geographic imagery and positional information on friendly, neutral, and enemy units. The system provides advanced planning and decision aids, such as communication and emitter propagation analysis tools. If successful, the FCT project will have the added benefit of increasing interoperability with U.S.



allies. The objective is to integrate MARIA into the Navy's Global Command and Control System-Maritime (GCCS-M) or the GCCS Integrated Imagery and Intelligence program. After

two years of initial FCT evaluation, during which MARIA was shown to be viable, the FCT was re-structured to coincide with emerging changes to the GCCS-M requirements of Commanders U.S. Atlantic and Pacific Fleets and, in mid-FY 2004, central project execution was transferred to the Fleet. A test article contract was awarded in first quarter FY 2005 to Teleplan through its U.S. representative, *Native American Industrial Distributors, Inc.* MARIA training was conducted in December 2004 at the North Island Naval Air Station in San Diego, California. Integration of MARIA into the Navy's Readiness Reporting System is in progress.

Mine Countermeasures (MCM) Small Unmanned Underwater Vehicle – Iceland – 2004

This project is evaluating the capabilities of small unmanned underwater vehicles (UUVs) designed for operations in the very shallow water zone (10 to 40 foot depth). The foreign candidate is the "GAVIA" developed by *Hafmynd of Reykjavik, Iceland* which is operational with the Icelandic Marine Research Institute and the University of Iceland. GAVIA incorporates several features that are not fielded by domestic producers, but have been identified as features needed for the UUVs to successfully operate and survive in a mine countermeasures environment. This type of small underwater vehicle can be used to search coastal areas and identify hazards to naval operations in preparation for amphibious assault, force protection, and harbor security operations. The project is being conducted by the Program Executive Officer for Littoral and Mine Warfare at the Naval Sea Systems Command with technical test support from the Space and Naval Warfare Systems Center in San Diego, California, and Naval Special Clearance Team One UUV Platoon in Coronado, California. A contract was awarded to Hafmynd in May 2004 for fabrication of GAVIA test units for the Navy evaluation. Due to unforeseen production delays, the Navy has revised the project schedule to allow the contractor more time for in-water checkout of the assembled system. The GAVIA test vehicle is now scheduled for delivery to the Navy in the summer of 2005.



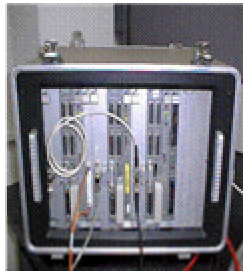
Mobile Acoustic Support System (MASS) - Canada – 2004



This project is evaluating a mobile analysis system developed by *General Dynamics-Canada* and in service with Canadian, Australian, and British forces. The goal is to meet a Navy requirement to replace obsolete equipment employed for Post Flight Analysis of sonobuoy (underwater



microphone) acoustic data recorded on Maritime Patrol Reconnaissance Aircraft conducting anti-submarine warfare missions. Also under evaluation in the project is a domestic in-production system presented by *BBN Technology Solutions, Cambridge, Massachusetts*. The MASS system is designed to operate from fixed shore sites, deployed remote areas, and onboard ships. The project is being conducted by the Space and Naval Warfare Systems Center, Charleston, South Carolina. Test results are to be briefed in Canada in August 2005.

Naval Active Intercept and Collision Avoidance – Australia – 2004

This project is evaluating a system developed by *Sonartech of Australia* to support the U.S. submarine forces' number one priority: collision avoidance and situational awareness. Sonartech is teamed with *MIKEL, Inc., Fall River, Massachusetts*, for the project. The Australian system detects and localizes emissions from active sources such as sonar, sonobuoys, and active homing torpedoes using hydrophone sensors already installed on U.S. submarines. System functionality

is being assessed against the requirements for the AN/WLY-1 countermeasures detection and control set currently employed on SSN-688, SSN-21, and SSN-774 class submarines. The project is being conducted by the Program Manager, Submarine Acoustic Systems (PMS-401) at the Naval Sea Systems Command, with technical test support from the Naval Underwater Warfare Center, Newport, Rhode Island. In fourth quarter FY 2004, testing and modeling of government-furnished hydrophone sensors was initiated at the University of Rhode Island Acoustic Tank Facility prior to being integrated with the Australian system. Testing of the integrated systems is planned for the late summer 2005 at the Navy's Seneca Lake Sonar Test Facility in New York.

Pitch Adapting Composite Marine Propeller – Germany – 2004

This project is evaluating commercial Contur-series propellers developed by *AIR Fertigung- Technologie GmbH, Rostok, Germany*, to improve submarine stealth. The propeller blades are designed to flex in a controlled manner under certain operating conditions which causes a pitch change that is claimed to improve vehicle stealth, speed, and propulsion efficiency. In addition, the pitch change reduces cavitation damage, marine growth fouling, and permits in-water blade replacement. This advanced performance is enabled by blades constructed from carbon fibers instead of traditional metals. The project is being conducted by the

Program Manager for SSBN (PMS-392) in support of the Advanced Swimmer Delivery Vehicle Program at the Naval Sea Systems Command, with technical support by the Propulsion and Fluid Systems Division, Naval Surface Warfare Center in Carderock, Maryland. The test article contract was awarded to the German vendor in third quarter FY 2004. Hub and flex propeller design and fabrication began in December 2004 and were completed in second quarter FY 2005. The first series of water tunnel tests were conducted at Carderock with mixed results. The manufacturer is refining the propeller design, with early August tunnel re-tests planned at Carderock.



Replacement Structures for Aircraft – Poland – 2003

This project is qualifying *PZL-Swidnik of Lublin, Poland*, as an approved source for the manufacture of aluminum honeycomb panels and sub-structures to support in-service, out-of-production aircraft. The Polish company is teamed with *Alcore, Inc. of Edgewood, Maryland*, with manufacturing support from *Pryer Machine and Tools, Tulsa, Oklahoma* and *Aero Fabricators, Dallas, Texas*. The immediate objective of the project is to provide a cost-effective solution to the warfighter for the replacement of flight control surfaces and sub-structures on F-14 “Tomcat” and EA-6B “Prowler” aircraft, which are no longer in production and for which parts are no longer available from the original manufacturer. The test program is being

conducted by the Navy’s F-14 Program Manager, Structures Division, at the Naval Air Warfare Center, Patuxent River, Maryland, with technical support from Aurora Flight Sciences in Manassas, Virginia. Scheduling and arrangements for direct contract negotiations in Poland with PZL-Swidnik authorities were hampered by combat operations in Afghanistan and Iraq, thus an initial project acquisition contract was not finalized until third quarter FY 2004. Phase I testing and analysis of coupon specimens fabricated by PZL-Swidnik began in January 2005 at the Navy’s Materials Laboratory in Jacksonville, Florida. The project is continuing with the possible addition of the Air Force’s F-16 Program Office which showed interest in joining the FCT effort in fourth quarter FY 2004.

Resilient Abrasive-Resistant Skirt for LCAC (Landing Craft-Air Cushion) – Italy, Sweden, United Kingdom – 2003

This project is evaluating hovercraft skirt materials developed by *Reeves SpA. of Italy* (dropped from the project in FY 2004), *Trelleborg of Sweden*, and *Icon Northern Rubber of the United Kingdom* to determine their capabilities to provide a 50 percent improvement in the LCAC skirt’s resistance to abrasion without a weight or cost penalty. The Amphibious Warfare Programs Office (PMS-377) at the Naval Sea Systems Command is conducting the test program at the Naval Surface Warfare Center, Coastal Systems Station Dahlgren Division in Panama City, Florida, with test support from Assault Craft Units (ACU) 4 and 5, technical and manufacturing support from Bell Avon Inc., Picayune, Mississippi, SMR Technologies of Fenwick, West Virginia, and laboratory test support from Smithers Scientific of Akron, Ohio.



The project schedule was delayed for several months pending foreign disclosure authorization. Icon Northern Rubber and Trelleborg materials were received for Phase I in second quarter FY 2004 (laboratory tests at Smithers and skirt “finger” tests by ACU 4/5 on LCAC platforms in Panama City). In this same time period a corporate decision was made by Reeves SpA that its parent company in the U.S., Reeves Brothers, Inc. of Rutherfordton, North Carolina, would provide their candidate materials for the FCT project, essentially establishing the Reeves product as a domestic, not foreign, contender. Reeves Brothers, Inc was eliminated from the project, having failed to respond to the Navy solicitation for materials for Phase II testing.

Shipboard Anti-Jam GPS Antenna – United Kingdom – 2003

This project is evaluating the GAS-1 Global Positioning System (GPS) anti-jam antenna for Navy surface ship applications. The GAS-1 is produced by *Raytheon Systems Ltd. (Cossor)*, Harlow, United Kingdom, and is mounted on large U.S. Air Force aircraft. GPS provides continuous, worldwide, precise navigation to unlimited users in all weather conditions. The encrypted military code ensures that the U.S. military and its allies have a

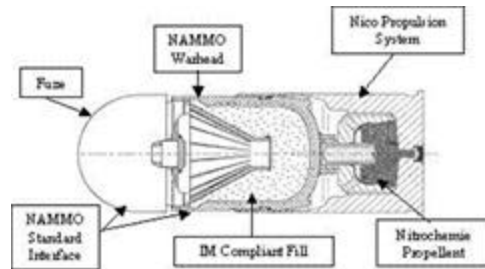


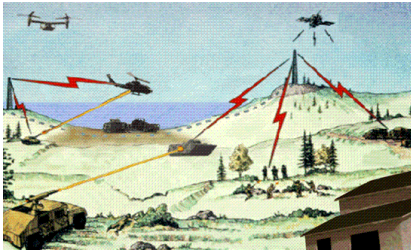
superior navigation capability; however, the GPS signal from the satellites is of very low power and is vulnerable to jamming. It is expected the British item will satisfy the anti-jam effectiveness of the Navy's operational requirement for GPS user equipment, since the FCT Program previously qualified the smaller GAS-1N anti-jam antenna for tactical aircraft. The FCT project builds on ongoing sponsor-funded tests of the British system utilizing an Avenger class Mine Countermeasures ship (MCM) and a Landing Craft Air Cushion (LCAC) platform. Particular emphasis is being placed on electromagnetic compatibility in the dense electronic environment of a Navy battle group. The Navy Navigation Systems Program Office of the Space and Naval Warfare Systems Command is managing the test program, in coordination with the Space and Naval Warfare Systems Center in San Diego, California.

**U.S. MARINE CORPS****40mm High Explosive Dual Purpose (HEDP) Improvement – Germany, Norway, Switzerland (joint with USSOCOM) – 2004**

This project is evaluating an improved propulsion propellant "after armor effect" technology and a standardized fuze interface integrated into a 40mm High Explosive Dual-Purpose cartridge for use in both the MK19 Grenade Machine Gun and MK47 Advanced Lightweight Grenade Launcher. *NAMMO of Norway* developed the warhead and standardized fuze interface, *Nico-Pyrotechnik of Germany*

developed the propulsion system, and *Nitrochemie AG of Switzerland* developed the propellant for the cartridge to be evaluated. The project is being managed by the Program Manager for Ammunition, Marine Corps Systems Command at Quantico, Virginia. Qualification testing will be initiated fourth quarter FY 2005 in Norway.



Deployable Instrumentation for Marine Air Ground Task Force (MAGTF) Training – Sweden, Switzerland – 2003

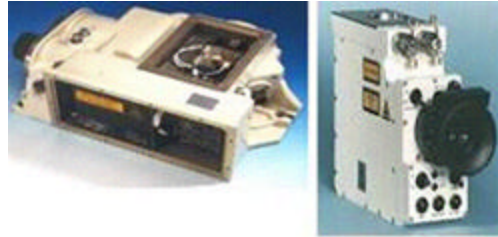
This project is evaluating mobile Range Instrumentation Systems developed by *Saab Training Systems of Sweden* and *RUAG (formerly Swiss Electronics) of Switzerland* to meet Marine Corps requirements to integrate current deployable training devices used for force-on-force training. The evaluation will demonstrate the candidates' abilities to provide track reporting, engagement adjudication of simulated direct and indirect fire (including battlefield audio and visual cues), and recording of all movement and engagement criteria for use in exercise after-action reviews. The test program is being conducted by the Program Manager, Training Systems-Ranges and Instrumentation, Marine Corps Systems Command, and includes integration at the vendors' facilities and operational testing by Marine Corps infantry units at Marine Corps Base, Quantico, Virginia, and Camp Pendleton in California. Test article contracts were awarded in fourth quarter FY 2003. Both Saab Training Systems and RUAG have completed preliminary system integration testing with the Government Furnished Equipment. The RUAG candidate underwent operational testing by Dismounted Marines with Light Armored Vehicles (LAV-25) at Camp Pendleton in October 2004. Operational tests of both candidates are expected to be completed by the end of third quarter FY 2005, at which time field evaluations will begin.

Deployable Multi-Purpose Moving Target System – Germany – 2004

This project is evaluating a deployable, moving, pop-up, automated marking and targeting system developed by *Thiessen Training Systems GmbH of Germany* which is an enhancement for range performance, target lifting life, hit indication, and other critical reliability performance parameters. A successful FCT will enable Marines to train as they fight and enhance proficiency with anti-armor engagement tactics. The test program is being conducted by the Marine Corps Program Manager for Training Systems with technical support from the Marine Corps' Warfighting Laboratory at Quantico, Virginia. A test article contract was awarded in April 2004. In fourth quarter FY 2004, two completed deployable target systems were delivered to Thiessen's U.S. facility in Chiefland, Florida, where operational testing was conducted in April 2005, including engagement testing of the German system with the Marine Corps' MILES 2000 Tactical Engagement Simulation System and the Special Effects Small Arms Marking System (SESAMS) training system. The live fire testing with SESAMS and MILES met with positive results. The decision was made to proceed to Phase II of the test program.

Eye-safe Laser Rangefinder for M1A1 Tank – Germany, United Kingdom – 2003

This project is evaluating eye-safe lasers developed by *Zeiss of Germany* and *Thales (formerly AVIMO) of the United Kingdom* to assess range, beam divergence, output energy, shot life, receiver field of view, sustained rate of ranging, and other parameters used to locate distant targets for the Marine Corps' M1A1 Battle Tank Firepower Enhancement Program. The eye-safe laser is expected to increase the range performance by 2000 meters. The Marine Corps Systems Command at Quantico, Virginia, is conducting the test program in conjunction with the Marine Corps Operational Test and Evaluation Activity at the Aberdeen Test Center, Maryland, and the Army's Night Vision and Electronic Sensors Directorate at Fort Belvoir, Virginia. Test article contracts were awarded to both vendors in third quarter FY 2003. In third quarter FY 2004, laboratory testing was completed at the vendors' facilities in England and Germany. The units were integrated into the M1A1 Main Battle Tank and evaluated at Picatinny Arsenal, New Jersey. Qualification tests have been completed on the Zeiss laser and are in progress with the Thales candidate. During FY 2005, developmental tests are planned to be conducted at Fort A.P. Hill, Virginia; Aberdeen Test Center, Maryland; and Yuma Proving Ground, Arizona. A Milestone C (production) decision is expected at the end of FY 2005.

**Floating Smoke Pot System – Germany – 2001**

This project is evaluating a Floating Smoke Pot System manufactured by *Diehl Munitionssysteme (formerly Comet Pyrotechnik) of Germany* to replace the current K867 floating smoke pot for training and combat on land and in the water. The current K867 floating smoke pot produces a smoke which has carcinogenic properties and a fuze that has experienced reliability problems. The German item emits infrared smoke to screen troops in low-light situations against night-vision devices. The test program is being conducted by the Marine Corps Systems Command, Program Manager for Ammunition, Quantico, Virginia, at the Naval Surface Warfare Center in Crane, Indiana. The test article contract was awarded in late FY 2001. Phase I first article acceptance tests completed during FY 2002 at the manufacturer's facility in Goellheim, Germany, showed that the German item required design modifications to meet all critical performance parameters. The modifications were successfully completed by the end of FY 2004, and Phase II acceptance testing was completed by the Marine Corps in first quarter FY 2005. Insensitive munitions testing began in third quarter FY 2005 at the Naval Surface Warfare Center in Dahlgren, Virginia.

JSLIST Alternative Footwear Solution – Canada – 2004

This project is evaluating a one-size-fits-all, small packaged chemical-biological protective boot developed by *Airboss Defense (formerly Acton International) of Canada* to meet urgent requirements of the Joint Service Lightweight Integrated Suit Technology (JSLIST) program. A successful FCT will enable improved operational suitability for the warfighter, meet urgent needs, and result in at least an estimated 25 percent production cost savings. The project is being managed by the Marine Corps Systems Command, Combat Equipment and Support Systems, Nuclear, Biological and Chemical Systems, Quantico, Virginia. The test program was initially carried out at Marine Corps Air Station Yuma, Arizona, by Marine Air Wing Training Squadron One with support from Marine Wing Support Squadron 371 and Combat Service Support Detachment 16. As of July 2004, the results of testing to date supported an urgent procurement for the U.S. Navy of 175,000 boots over FY 2004 and FY 2005 valued at \$6.5 million. Testing of the Canadian footwear is continuing under the direction of the Program Executive Officer for Chemical and Biological Defense located at Edgewood Arsenal, Maryland.

**JSLIST Block II Glove Upgrade – Canada – 2004**

This project is evaluating nuclear, biological, chemical (NBC) protective gloves manufactured by *Airboss Defense (formerly Acton International)* to meet the requirements for a “JB2GU” glove, a component of the Joint Service Lightweight Integrated Suit Technology (JSLIST) ensemble being developed for Army, Marine Corps, Navy and Air Force military personnel. The JB2BGU will be worn as part of the NBC protective ensemble and will allow the warfighter to perform a full range of missions in NBC environments for extended periods by increasing tactility, dexterity, and durability beyond that found in the currently fielded butyl glove. The project is being managed by the Marine Corps Systems Command, Combat Equipment & Support Systems, Nuclear, Biological and Chemical Systems, Quantico, Virginia. The test program is being carried out at Marine Corps Air Station Yuma, Arizona, by Marine Air Wing Training Squadron One with support from Marine Wing Support Squadron 371 and Combat Service Support Detachment 16. Initial field durability developmental testing was completed in Yuma in March 2004. Phase II of the project, including the evaluation of chemical agents, human factors, aviation, durability, and physical properties was initiated in fourth quarter FY 2004 at Yuma, Camp Lejeune, North Carolina, and at the Natick Clothing and Textile Research Facility in Massachusetts and was completed in first quarter FY 2005. Phase III of the JB2GU glove evaluation is scheduled to begin in July 2005.

Lightweight Prime Mover for Lightweight 155mm Towed Howitzer – Germany, Switzerland, United Kingdom – 2004

This project is evaluating high mobility off-road vehicles manufactured by *Krauss-Maffei-Wegman (MUNGO)* of Germany, *MOWAG* of Switzerland, *Automotive Technik Ltd. (PINZGAUER)* and *Supacat (HMT)* of the United Kingdom to satisfy the requirement for a prime mover for the Marine Corps' M777 Lightweight 155 mm Medium Towed Artillery Howitzer. Evaluation of the vehicles will focus on towing capability, operational suitability, and external transport via CH-53E and MV-22 Osprey.



Currently there is no capability to effectively move the M777 around the battlefield during a vertical lift mission. The project is being managed by the Marine Corps Systems Command, Ground Transportation and Engineer Systems, Program Manager for Motor Transport, Quantico, Virginia. Testing will be conducted at the Nevada Automotive Test Center, Carson City, Nevada. The Request for Proposals for the test vehicles was released in first quarter FY 2005.

Mounted Cooperative Target Identification System – United Kingdom – 2004



This project is evaluating a battlefield target identification system in production by *Thales Missile Electronics of the United Kingdom*. It appears to be capable of meeting the Marine Corps requirement for a Mounted Cooperative Target Identification System (MCTIS) which will provide a positive-encrypted



identification of friend or unknown on the battlefield, thereby reducing incidents of fratricide. The system is intended to for bore-sighting through the gunner's primary sight on Marine Corps M1A1 Tanks, Light Armored Vehicles, and Expeditionary Fighting Vehicles. A successful FCT will allow the Marine Corps to train and fight with positive identification capability of friends in the joint and coalition combat environments. The project is being managed by the Marine Corps Systems Command, Combat ID Project Office, Quantico, Virginia. A test article contract was awarded to Thales Missile Electronics in May 2004. Design proof testing and environmental and stress screening tests were completed at the vendor's facility in Basingstoke, England in July and August 2004. MCTIS test articles were delivered to the Naval Surface Warfare Center in Crane, Indiana, in January 2005 where the test program is underway. It is planned for Crane to integrate the delivered hardware into 4 M1A1 Main Battle Tanks of the Marine Corps' 2nd Tank Battalion at Camp Lejeune, North Carolina, for shipment to the United Kingdom and participation in an upcoming Combat ID/Advanced Concept Technology Demonstration (ACTD) exercise to be held from September 2005 through March 2006.

NBC Integrated Footwear System (formerly NBC Multipurpose Protective Sock) – France, Germany, United Kingdom – 2002



This project is evaluating candidate launderable socks developed by *Paul Boye of France, Texplorer GmbH and Helsa-Werke GmbH of Germany, and Purification Products, Ltd. of the United Kingdom* as integral components of the Joint Service Lightweight Integrated Suit Technology (JSLIST) ensemble. The Integrated Footwear System (IFS) component of the ensemble must provide chemical/biological and friction protection to the foot when worn inside the warfighter's footwear. The project is being managed by the Marine Corps Systems Command, Program Manager for Combat Equipment and Support Systems, Nuclear, Biological, and Chemical Systems, Quantico, Virginia. A Request for Proposals was issued

in November 2004, product samples were received from all vendors shortly thereafter, and Phase I dimensional and physical properties tests were initiated at the Natick Clothing and Textile Research Facility in Massachusetts. Durability testing is also underway at Fort Benning, Georgia, by the Army's 75th Ranger Regiment.

Remote Control System for Assault Breacher Vehicle – United Kingdom – 2004

This project is evaluating a Remote Control System manufactured by *Pearson Engineering of the United Kingdom* for integration into the Marine Corps' Assault Breacher Vehicle (ABV). The ABV is a cost-effective, efficient, survivable platform with Main Battle Tank speed



and mobility capable of conducting in-stride breaching of minefields and complex obstacles. The Marine Corps' ABV program attained Milestone B approval in July 2003 when permission was granted to build and test three production prototypes. The FCT evaluation of the remote control system is being performed as part of the overall ABV



System Development and Demonstration tests that began in FY 2005. The Marine Corps Systems Command, Program Manager for Engineer Systems at Quantico, Virginia, is managing the FCT project with the test program to be conducted at various test locations, including the Aberdeen Test Center in Maryland.

Special Effects Small Arms Marking System (SESAMS) – Canada – 2003

This project is evaluating the safety and integration suitability of *SNC Technologies (Simunitions)* 5.56mm linked low-velocity training munitions and weapon conversion kit for the M249 Squad Automatic Weapon. SESAMS is a user-installed weapons modification kit that allows the individual Marine to fire low-velocity marking ammunition at short range while precluding the weapon from firing live



ammunition. The system must provide normal environment cues, immediate target feedback, non-toxic primers, and a non-toxic marking medium. The test program is being conducted by the Program Manager, Training Systems (PM-TRASYS)-Ranges and Instrumentation, Marine Corps

Systems Command at Quantico, Virginia, in coordination with the Marine Corps Operational Test and Evaluation Activity, and the Marine Corps Warfighting Laboratory at Quantico. The SESAMS 5.56mm linked munitions and conversion bolt have undergone extensive safety testing at the Naval Surface Warfare Center in Crane, Indiana, to verify that the training munitions will not cause any bodily harm and to ensure that the converted M249 will not be capable of firing



live ammunition. Technical testing has been completed at Crane, with favorable results forwarded to PM TRASYS and the Navy's Weapon System Explosives Safety Review Board. SNC has delivered 40 M249 Conversion Kits and 134,000 rounds of marking cartridges for additional force-on-force testing to be conducted at the Quantico Marine Corps Base with elements from the Marine Corps Warfighting Laboratory and Marine Corps Systems Command. In

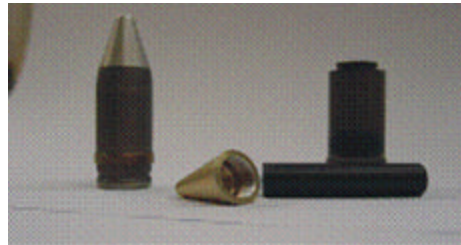
convoy operations training exercises at Fort Carson, Colorado, members of the 1st Space Battalion remarked, *"...it was a lot more realistic training than the MILES equipment...there is no dispute as to whether you get hit or not...there is a colored mark on your clothes, equipment, or body armor."* A Milestone C decision is expected by third quarter FY 2005.



AIR FORCE

20MM Replacement Round – Germany, Switzerland – 2004

This project is evaluating 20mm aircraft gun ammunition developed by *Diehl Munitionssysteme of Germany* (PELE rounds) and *Oerlikon of Switzerland* (FAP rounds) to replace current 20mm combat rounds with limited mission effectiveness and place pilots and aircraft at risk. Although the current PGU-28B ammunition meets requirements for employment



ranges and target damage, use is currently suspended due to in-barrel detonation incidents that caused aircraft damage and could have resulted in pilot deaths and aircraft losses. The project is being conducted by the Ogden Air Logistics Center's Air-to-Surface Munitions Directorate at Hill AFB, Utah, with test support from the 53rd Wing, Air Combat Command at Eglin AFB, Florida. "Quick look" testing of a limited number of rounds began at Eglin

AFB in second quarter FY 2004. Comprehensive performance and safety assessments were completed on both foreign kinetic energy rounds (PELE and FAP) in first quarter FY 2005 preliminary to clearance for live fire and operational testing. The German PELE round has been down-selected for the operational tests scheduled for September 2005.

Guidance Components for Missiles – Canada, France, Germany, Israel, Sweden, United Kingdom – 2004



This project is evaluating the performance of missile guidance components developed by *Curtiss Wright (formerly DY4/Force Computers) of Canada, Thales Computers of France, SBS (OR) Technologies of Germany, Aitech Defense of Israel, Saab Ericsson Space of Sweden, and Radstone Technology of the United Kingdom.* Domestic components developed by *Honeywell* are also being evaluated. Improvements to basic guidance and control (G&C) technology and miniaturization of G&C components



have potential to enhance the performance of U.S. non-strategic missile systems. Advanced components have been developed, are being used by foreign suppliers, and are candidates for straightforward integration into U.S. programs. The project is sponsored by the Rocket Systems Launch Program and is being conducted by the Space and Missile Systems Center Detachment 12, Air Force Space Command, assisted by the Air Force Research Laboratory at Kirtland AFB, New Mexico, with technical oversight by Northrop Grumman Corporation and test support by Orbital Sciences Corporation in Chandler, Arizona, and L3 Coleman Aerospace. Test article contracts were awarded to Radstone and Curtiss Wright for delivery of their components to Utah State University in Logan, Utah, for testing. Performance testing at Utah State was completed in first quarter FY 2005. Even though the Curtiss Wright computer out-performed the Radstone candidate, both vendors' products provide sufficient performance to meet user requirements and both were referred for environment qualification testing planned for mid-2005.

MEMS Inertial Measurement Units (IMU) – United Kingdom – 2004



This project is evaluating the *BAE Systems of the United Kingdom* Micro Electro-Mechanical IMU (SiIMU01/02) which is reported to be a significant size, weight, and cost advantage over technologies currently employed in U.S. Intercontinental Ballistic Missiles, Reentry Vehicles, and precision weapons requiring an IMU. A domestic MEMS IMU developed by *Honeywell* is also being evaluated. IMU costs are a major contributor to the high overall costs of the guidance system. The IMU's relatively large size also has driven the guidance

system to be a significant portion of the payload mass that is lifted by the propulsion system, thereby reducing the available mass for the lethal portion of the payload. The objective is to leverage the emerging MEMS technology which has been demonstrated in areas such as telecommunications, automobiles, and biotechnology. The project is sponsored by the Rocket Systems Launch Program and is being conducted by the Space and Missile Systems Center Detachment 12, Air Force Space Command, assisted by the Air Force Research Laboratory at Kirtland AFB, New Mexico. Test support is being provided by Orbital Sciences Corporation in Chandler, Arizona, L3 Coleman Aerospace, Draper Laboratories, Cambridge, Massachusetts, and the 46th Test Squadron at Holloman AFB, New Mexico. The test article contract was awarded in fourth quarter FY 2004.

Missile Reserve Battery Replacement – France, Japan, Republic of Korea – 2003

This project is evaluating battery cells developed by *Saft Alcatel of France* and *Japan Storage Battery, Ltd. (Nippondenchi) of Japan* and *SKC of the Republic of Korea* for use in missile/booster environments.



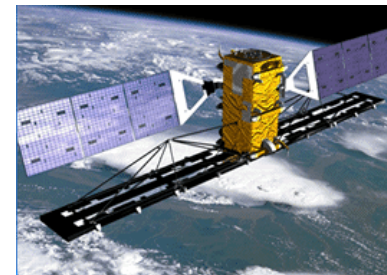
With the decline of military missile development and the downsizing of strategic forces, several U.S. battery manufacturers for these applications have discontinued production, leaving *EaglePicher of Phoenix, Arizona* as the only qualified U.S. source of batteries for missile/booster applications. The intent is for EaglePicher to assemble the batteries with cells from candidate sources incorporating the newer technologies. The Air Force Space and Missile System Center's



Peacekeeper Reuse Program Office at Kirtland AFB, New Mexico, is conducting the test program as part of the Air Force's ongoing Rocket Systems Launch Test Program. All candidate batteries were delivered to Crane and the test program began in March and April, 2004. Battery cell performance testing was completed in fourth quarter FY 2004. Analysis of the test results is continuing in FY 2005.

RADARSAT II Commercial High Resolution SAR – Canada – 2004

This project is evaluating the ability of the Canadian RADARSAT II, developed by *MacDonald-Dettwiler of Canada*, to provide all-weather imaging capability at 3-meter resolution for the support of target detection, ocean surveillance, homeland defense, moving target indicators, and disaster response as an upgrade when integrated with the Air Force's Eagle Vision Deployable Satellite Imagery Receiving and Processing Station, qualified for procurement and fielded by the Air Force as the result of a previous successful FCT



project. The Canadian RADARSAT II satellite is the first commercially-available high resolution Synthetic Aperture Radar imaging capability. The project is being conducted by the Air Force Electronic Systems Center at Hanscom AFB, Massachusetts. Factory acceptance tests were completed successfully in March 2005 and planning for the integration of RADARSAT II capabilities into Eagle Vision has been initiated.

Rayon for Heatshield and Motor Nozzles – Austria, Belgium, France, Germany, United Kingdom – 2003

This project is evaluating high-quality rayon from *Lenzing Technik of Austria*, *Fabelta of Belgium*, *Snecma Moteurs of France*, *Acordis of Germany*, and *Acordis of the United Kingdom* to meet Air Force requirements for use in high-temperature applications such as heat shields and rocket motor nozzles. There are no longer any domestic suppliers of aerospace-grade rayon for rocket nozzles and reentry heat shield thermal protection, and dwindling stockpiles must be replaced for future systems. The Air Force Space and Missile Center's Peacekeeper Reuse Program

Office at Kirtland AFB, New Mexico is conducting the test program with test support from the Arnold Engineering Development Center (AEDC), Arnold AFB, Tennessee, SRI International in Palo Alto, California, and the Aerojet Corporation in Sacramento, California. Previous testing by the National Aeronautics and Space Administration showed the Enka rayon-

based material to be equal to that of NARC products in rocket nozzle tests. These three candidate materials will be recommended in the final report as “drop in” replacement candidates for further testing and application depending on the needs of the agency. The Reentry Vehicle Applications Systems Program Office at Hill AFB will, reportedly, be procuring some Snecma C2 and flying the material on a reentry vehicle aboard GT-190 scheduled for launch in March 2006.

Wideband Klystron for E-3 AWACS – United Kingdom – 2000

This project is evaluating a wide-band klystron power amplifier manufactured by *Thorn Microwave Division of the United Kingdom* that promises greater reliability and much lower operating and maintenance costs. The current klystron power amplifier has a low mean-time-between-failure rate and is costly to repair. The British unit promises a 30-fold increase in reliability, increasing aircraft availability by 20 days when the Thorn klystron is incorporated into the AWACS fleet. The Air Logistics Command at Tinker AFB in Oklahoma is conducting the test program with technical support from Northrop Grumman, Baltimore, Maryland, Dynamics Research Corporation, Andover, Massachusetts, and Calabazas Creek Research in Saratoga, California. The latest test article contract was awarded in late FY 2001. Based on the positive results from testing to date, the AWACS Program Office received an additional \$24 million starting in FY 2004 to purchase the new Wideband Klystron, for which requirement the British candidate is being evaluated. The AWACS Program Office opted not to wait for attrition of the old units but to start a replacement program as soon as the new tubes are delivered. Delivery of flight certification units is expected to commence in September 2005.



U.S. SPECIAL OPERATIONS COMMAND

40mm Enhanced Grenade Launcher Module for M4 Carbine – Belgium, Germany – 2003



This project is evaluating state-of-the-art grenade launcher modules manufactured by *FN Herstal of Belgium* and *Heckler and Koch of Germany* in a two-phased test program managed by the Naval Surface Warfare Center in Crane, Indiana. The objective of the project is to select a suitable launcher to replace the current M203 Grenade Launcher which is a single shot breech-loaded 40mm weapon designed especially for attachment to the M4 carbine or M16 rifle. The M203 is over 30 years old and is becoming logistically unsupportable. In October 2004, upon completion of the initial assessment of candidate test articles from FN Herstal and Heckler and Koch, a down-select to one final candidate was completed. The FN Herstal EGLM was selected for integration and final testing for the new Special Operations Forces' Combat Rifle requirement. Technical and operational testing is proceeding into FY 2005. Information gained from these tests will be used to support a procurement decision.

Advanced Family of Interfaces for Chemical-Biological Protective Clothing – Germany, Japan, Switzerland – 2004

This project is evaluating promising new types of chemical protective (CP) garment closures and interfaces developed by *YKK Universal Fasteners of Japan*, *TiZip of Germany*, and *RiRi SA of Switzerland*. With the emergence of Selectively Permeable Membrane and other barrier material technologies for CP garments, there is a need for enhanced methods of sealing the garment interfaces. The vulnerabilities remaining, despite new barrier materials, are at the interfaces with the wrist, ankles, zippers, and the neck of CP garments as demonstrated in recent vapor and aerosol testing. This project is being conducted by the Special Operations Forces Warrior Protection Office at the Army's Natick Soldier Center in Massachusetts in conjunction with the Hazardous Materials Research Center at Battelle Memorial Institute in West Jefferson, Ohio, and the Research Triangle Institute (RTI) near Raleigh, North Carolina. Beginning in second quarter FY 2004, the Personnel Protection Ensemble (PPE) suit manufacturer for this project, Kokatat, Inc. of Arcata, California, assessed the candidate zippers for compatibility with the PPE suit design. The *Swiss RiRi* zipper was not technically ready for insertion into membrane material garments and was dropped from the project. In fourth quarter FY 2004, the Kokatat PPE suits with the FCT candidates incorporated into them began system-level aerosol and vapor penetration testing at RTI and Battelle.

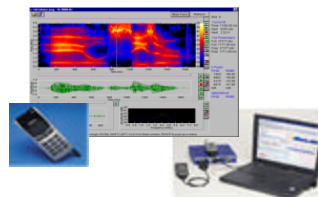
**Deployable GSM Cellular Network – Sweden (joint with Army) – 2004**

This project is evaluating a commercially-available transportable cellular network developed by *Ericsson Systems of Sweden*, the third generation Universal Mobile Telecommunications System (UMTS) which is capable of supporting up to 5,000 users and which can be deployed worldwide as a stand-alone unit in support of mission requirements in austere environments. If testing is successful, the Swedish equipment will satisfy critical requirements of the

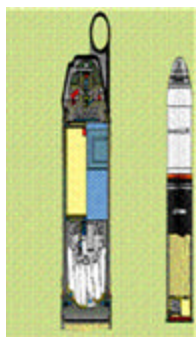
Special Operations Forces Tactical Assured Connectivity and Joint Threat Warning Systems Programs, and the Army's Warfighter Information Network-Tactical (WIN-T) Program, which will provide the warfighter access to high-speed data communications. The Army Communications and Electronics Command at Fort Monmouth, New Jersey, is conducting the test program in coordination with the U.S. Special Operations Command's Program Executive Officer for Intelligence and Information Systems at MacDill AFB, Florida. Test support is being provided by the Navy's Space and Naval Warfare Systems Center in Charleston, South Carolina, and the Pennsylvania State University Applied Research Laboratory, State College.

Global Cellular Phone System Optimization/Enhancements – Canada, Denmark, Sweden, UK – 2003

This project is evaluating commercially-available mobile cellular phone systems (GSM) from various global manufacturers to determine if they provide increased range, improved data throughput, and reduced probability of signal detection or intercept to meet Special Forces requirements. The Joint Threat Warning Systems Program Office at MacDill AFB, Florida, is conducting the test program with technical evaluation support from the Navy's Space and Naval Warfare Systems Center in Charleston, South Carolina, and the Pennsylvania State University Applied Research Laboratory, State College. Initial testing in second quarter FY 2004 revealed the Swedish candidate system did not meet requirements and it has been dropped from further evaluation. The test program is continuing into FY 2005 with the remaining candidates.

**Low Probability of Intercept Communications Intelligence Direction Finding – United Kingdom – 2004**

Special Forces require a capability to quickly and reliably detect sideband, spread spectrum-broadband and other types of low probability of intercept communication signals from potential adversaries. This project is evaluating commercially-available equipment that will detect these signals and provide threat warning to meet the requirements of the Joint Threat Warning System. The Joint Threat Warning Systems Program Office at MacDill AFB, Florida, is conducting the test program with test and evaluation support from the Navy's Space and Naval Warfare Systems Center in Charleston, South Carolina, and the Pennsylvania State University Applied Research Laboratory, State College. Originally, a candidate system developed by ELTA Electronics of Israel was to be evaluated; however, in the course of project planning in FY 2004 the company was deemed non-responsive to the project sponsor's requests for test article cost quotes. In August 2004 the Israeli candidate was dropped from the project. Arrangements were then made for delivery in January 2005 of comparable technology developed by *TRL Technology, Ltd. of the United Kingdom* for evaluation without jeopardizing the project schedule. Testing of the British unit is underway.

MAAWS Illumination Round – Sweden– 2001

This project is evaluating improved illumination ammunition developed by *Saab Bofors Dynamics of Sweden*, for employment with the 84mm Carl Gustaf M3 recoilless rifle (now adopted by U.S. Special Forces as the Multi-Role Anti-Armor Anti-Personnel Weapon System - MAAWS) which was qualified for U.S. procurement and fielding as the result of an earlier successful FCT project. This new round incorporates a new candle with improved burn duration and a reduced sensitivity fuze that meets U.S. safety standards. The Army's Armament Research, Development and Engineering Center at Picatinny Arsenal in New Jersey is conducting the test program for the Navy Special Warfare Command. Test rounds are being evaluated for safety and performance at the Aberdeen Test Center in Maryland and at the Naval Surface Warfare Centers at Crane, Indiana, and Indian Head, Maryland. Testing to date has revealed illumination levels exceeding requirements. Blast overpressure testing has been completed and final production qualification testing is underway.

SOF (Special Operations Forces) Combat Rifle – Belgium, Germany, Israel, Italy – 2004

This project is evaluating advanced 5.56mm rifles to meet requirements for a highly-reliable and modular combat rifle for Special Forces as a replacement for the aging M-4A1 carbine. The foreign candidate weapons that were considered for the project are developed by *FN Herstal of Belgium*, *Heckler and Koch GmbH of Germany*, *Israel Military Industries*, and *Beretta of Italy*. Three domestic candidates from *Knights Armament*, *Robinson Armament*, and *Colt's* were also considered for initial evaluation. The project is being conducted by the Naval Surface Warfare Center in Crane, Indiana. Initial product sample testing and early user assessments of candidate weapons were completed in September 2004. The weapon presented by *FN Herstal* was selected as the best candidate to proceed to final operational testing which is underway.

**Traveling Wave Tube Amplifier – France, Germany, Israel, United Kingdom – 2004**

This project is evaluating alternative traveling wave tube amplifiers developed by *Thomson Tubes Electroniques (Thales) of France*, *Dornier Satellitensysteme/ND SATCOM (EADS) of Germany*, *ELTA Electronics of Israel*, and *E2V of the United Kingdom* for use within the Joint Threat Warning System and Deployable Multi-Channel SATCOM (Satellite Communications) Systems. Reliable satellite communications are critical to Special Forces' missions and Tri-Band Satellite terminals currently use vacuum tube technology amplifiers. Test article contracts were awarded in third quarter FY 2004 and technical testing of the candidates is underway at the Navy's Space and Naval Warfare Systems Center in Charleston, South Carolina. Operational validation testing is scheduled to begin later in FY 2005.

NEW PROJECTS SELECTED FOR FY 2005

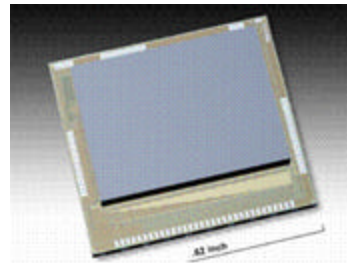
Nineteen new start projects were selected for FCT funding in FY 2005. A description of these projects follows.

Table 5. New Projects Selected for Fiscal Year 2005

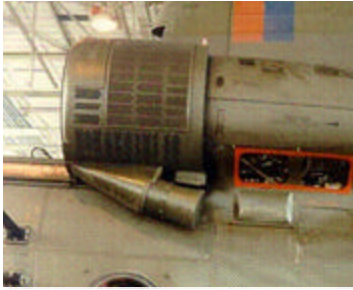
Sponsor	Project
Army	3 rd Generation Focal Plane Arrays (FPA) – United Kingdom Engine Air Particle Separator for CH-47 – United Kingdom Individual Serviceman Non-Lethal System – Belgium, Italy Laser Marksmanship Training System – Republic of Korea Miniature Synthetic Aperture Radar (MiniSAR) – Germany
Navy	Composite Shroud for Landing Craft Air Cushion (LCAC) – Finland, Norway, United Kingdom Diver Hull Inspection and Navigation System – Australia Improved Lube Oil Cooler for Landing Craft Air Cushion (LCAC) – Norway Link-16, 11B Management Integrator – United Kingdom Next Generation Underwater Breathing Apparatus – Canada, United Kingdom Shipboard Mast-Mounted Surveillance Pod – Australia, United Kingdom Telemetry Buoy for Underwater Communication System – Australia
Marine Corps	40mm Low Velocity HEDP Ammunition Improvement – Canada, Germany Highly Mobile Oxygen Supplementation System – Canada M16/M4 Training Bolt – Canada Multi-Spectral Camouflage Netting – Canada, Israel, Sweden
Air Force	None
U.S. Special Operations Command	40mm Tactical Marking Day/Night Training Cartridges – Germany 70mm Multi-Purpose Penetration (MPP) Warhead – Norway 84mm Multi-Target Warhead – Sweden Close Quarter Battle Pistol – Austria, Germany, Italy, Switzerland Tethered Balloon ISR Platform – Norway

**ARMY****3rd Generation Focal Plane Arrays (FPA) – United Kingdom**

This project is evaluating high-performance low-cost 3rd Generation Focal Plane Arrays developed by *QinetiQ* and *BAE Systems*, both of the United Kingdom. Qualification of these FPAs will support the Army's Future Combat System requirements to see first, understand first, act first, and finish decisively. QinetiQ and BAE have developed an alternative substrate for 3rd Gen FPAs which reduces the cost of today's current and future FPAs by 75% and increases the reliability by 200%, while meeting system requirements. The project will be conducted by the Army's Night Vision and Electronics Sensors Directorate at Fort Belvoir, Virginia, and will build on the Directorate's existing effort with QinetiQ to transition from a 2nd Generation to a 3rd Generation FPA production line. The FPAs will undergo qualification testing followed by field tests with the Long Range Acquisition Scout Sensor Suite (LRAS3).



Engine Air Particle Separator for CH-47 – United Kingdom



This project is evaluating an Engine Air Particle Separator (EAPS) developed by *Pall AeroPower Corporation* which is in service with the British Royal Air Force. The Pall unit is designed to decrease the erosion of engine components in dusty and sandy environments by means of swirling engine inlet air at a high velocity, thereby separating particulate matter via centrifugal force. This should significantly increase engine life. The EAPS currently used by the Army is the “long can” design which requires the unit to be moved forward on its mounting rails to open the engine cowling when performing maintenance or inspections. The British design is a “short can” that will allow maintenance to be performed without unfastening and moving the EAPS. The Cargo Helicopters Project Management Office in Huntsville, Alabama, is conducting the FCT test program which will include operational testing at the Army Aviation Test

Center at Fort Rucker, Alabama.

Individual Serviceman Non-Lethal System – Belgium, Italy

This project is evaluating two foreign non-lethal weapons developed by *FN Herstal of Belgium* and *Fabrika d’Armi Pietro Beretta of Italy* to fill a jointly-recognized increased need from the field for non-lethal capabilities for the individual Soldier. Both candidates may provide a higher rate of fire, greater effective engagement ranges and greater magazine capacity than currently



fielded weapons. The Army’s Product Manager for Close Combat Systems at Picatinny Arsenal, New Jersey, is conducting the test program in coordination with the Aberdeen Test Center, Maryland, the Human Effects Center of Excellence at Brooks AFB, San Antonio, Texas, and the Joint Non-Lethal Weapons Directorate at Quantico, Virginia. The FCT project is continuing; however, in January 2005 the Army issued an Urgent Material Release for 80 of the Belgian candidate weapons to the 18th Military Police Brigade deployed in Iraq. *“In the prisons, in order to quell fights and riots, we use less-than-lethal means to stop prisoners...we have started using them here...[the FN303] is easy to shoot and appears to be really effective” – 18th MP Brigade Training NCO.*

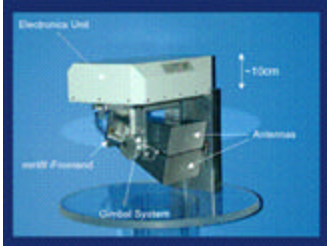
Laser Marksmanship Training System – Republic of Korea



This project is evaluating the “Hummerbook” notebook from *Seoul Standard of Republic of Korea*, a ruggedized laptop for harsh environments used for the Laser Marksmanship Training System (LMTS). The Seoul Standard product has been validated by the National Guard Bureau and is scheduled to be fielded to all National Guard armories and facilities, as well as all mobilizing and deploying National Guard units. Although the LMTS was designed as an indoor training device, the National Guard uses it effectively in outdoor marksmanship engagement simulations. A successful evaluation of the ruggedized unit will add value to the evolution of LMTS to a fully functioning Tactical Engagement Simulation System. The test program is conducted by the Army National Guard

Training Division and the Army's Product Manager for Ground Combat Tactical Trainers in Orlando, Florida, with technical testing support by Beamhit, Inc of Columbia, Maryland. The proposal for this project was originally submitted by the Marine Corps Systems Command at Quantico, Virginia, for Marine Corps management; however, in second quarter FY 2005, following approval by OSD, the Marine Corps and the Army mutually agreed to transfer management of the FCT project to the Army.

Miniature Synthetic Aperture Radar (MiniSAR) – Germany



This project is evaluating the MiniSAR, developed by the *European Aeronautic Defence and Space Company (EADS-Deutschland GmbH-Defense Electronics)*, a miniaturized Synthetic Aperture Radar sensor system which produces radar images in near-photographic quality in day and night conditions. The Army's Program Manager for Robotic and Unmanned Sensors (PM-RUS) at Fort Monmouth, New Jersey, is conducting the test program with system integration support from AAI Corporation in Hunt Valley, Maryland, to determine the Mini SAR's suitability and operational effectiveness for use on the Army's Shadow 200 Tactical Unmanned Aerial Vehicle (TUAV).



NAVY

Composite Shroud for Landing Craft, Air Cushion (LCAC) – Finland, Norway, United Kingdom

This project is evaluating composite propeller shrouds manufactured by *FY-Composites of Finland, Slingsby Aviation, Ltd. of the United Kingdom*, and *LMG Marin of Norway*, as potential replacements for the current LCAC propeller shrouds which are of a complex riveted construction, with high maintenance, material, and repair costs approaching \$450,000 per shroud per year. The one domestic supplier of the over 500 different parts for the current shrouds has gone out of production and is no longer interested in providing parts to the Navy. The composite shrouds to be tested in this project will be more easily repairable and are estimated to be 30% more reliable, thus reducing life cycle maintenance costs and increasing the LCAC's mission availability. The project is sponsored by the Amphibious Warfare Program Office (PMS-377) at the Naval Sea Systems Command. The test program is being conducted by the Naval Surface Warfare Center and Assault Craft Units 4 and 5 in Panama City, Florida.



Diver Hull Inspection and Navigation System – Australia



This project is evaluating a mature underwater survey system developed by *Advanced Technology Systems of Australia* to determine its suitability for use by U.S. Naval forces conducting Explosive Ordnance Disposal diving operations in support of Navy Force Protection which include searches and inspections of ship hulls, moorings, and pier-side berths for planted explosives or other dangerous



items. The Australian “Spot-On Ship Hull Survey System” is currently being used by the Swedish Coast Guard. It is an open architecture system that combines video streams from multiple sensors, underwater positioning data and the ship’s hull schematics to accurately track and record the diver’s underwater movements. The project will be conducted by the Explosives Ordnance Disposal Program Office, Naval Sea Systems Command at the Naval Surface Warfare Center, Panama City, Florida, with potential support from the U.S. Coast Guard.

Improved Lube Oil Cooler for Landing Craft, Air Cushion (LCAC) – Norway



This project is evaluating advanced coolers for the lube oil system on the engines of the Navy’s LCAC hovercraft. The new coolers, manufactured by *TTC Norge AS of Norway*, are in service in hovercraft applications in Europe and have potential to reduce procurement and life cycle maintenance costs, improve wear and corrosion resistance and increase the LCAC’s mission availability. The project is sponsored by the

Amphibious Warfare Program Office (PMS-377) at the Naval Sea Systems Command. The test program will be conducted by the Naval Surface Warfare Center and Assault Craft Units 4 and 5 in Panama City, Florida.

Link-16, 11B Management Integrator – United Kingdom

This project is evaluating an Air Defense System Integrator (ADSI) developed by *Ultra Electronics Advanced Tactical Systems (formerly Ultra Electronics Advanced Programming Concepts) of the United Kingdom*, as an add-on component that will integrate the reception, display, and transmission of messages through Link-11 and Link-16, an anti-jam, secure navigation and identification system to which the Joint Services and NATO forces are modernizing. The Ultra Electronics integrator may prove to have the interoperability required for the Multifunctional Information Distribution System-Low Volume Terminal 1 (MIDS LVT-1) which provides Link 16 digital data communications to combat aircraft, surface combatants, and command and control host systems. The project is being conducted by the Special Projects-Communications/Navigation Office, Maritime Surveillance Aircraft Leadership Program (PMA-290E) at the Naval Air Systems Command at Patuxent River, Maryland.



Next Generation Underwater Breathing Apparatus– Canada, United Kingdom



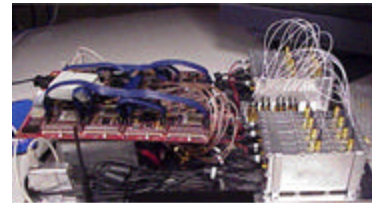
This project is evaluating state-of-the art diver life support equipment developed by *Carleton Life Support, Inc. of Mississauga, Ontario* (the VIPER) and *Divex, Ltd. of the United Kingdom* (Stealth EOD-M) to determine their suitability as a possible replacement for the MK16 diving equipment used by U.S. Naval Forces in underwater Explosive Ordnance Disposal mine countermeasures, naval special warfare missions, amphibious assault



preparations, and harbor security. The two candidate equipments are currently approved and in use by numerous NATO countries and will enhance diver safety, mission effectiveness, and interoperability with NATO and coalition partners. A domestic candidate (the MK16 Mod2) presented by *Carleton Technologies of Orchard Park, New York* will also be evaluated with project sponsor funding. The project is being conducted by the Explosives Ordnance Disposal Diving Systems Office, Naval Sea Systems Command at the Naval Surface Warfare Center in Panama City, Florida, with support from Explosives Ordnance Disposal Group Two.

Shipboard Mast-Mounted Surveillance Pod – Australia, United Kingdom

This project is evaluating the combined miniature beam forming and tuning technologies developed by *Sundance Digital Signal Processing, Ltd. of Australia* and *WinRadio Communications of the United Kingdom* for a Navy requirement to provide optimum shipboard surveillance performance from a mast-mounted system and for application to small unmanned aerial vehicle. Electronic beam-forming can provide excellent suppression of “co-site noise” (interference) created at the antennas of communications transmitters in close proximity on Navy ships. The Australian beam-forming processor offers a miniature form factor which, when combined with a group of 8 WinRadio small coherent tuners co-located with the antennas, provides better interference mitigation and improved signal strength. The Advanced Technology Branch of the Navy Space and Naval Warfare Systems Center in Charleston, South Carolina, is conducting the test program.



Telemetry Buoy for the Underwater Communication System – Australia



This project is evaluating a maritime buoy developed by *Nautronix MariPro of Fremantle* that provides effective underwater communications between different Navy platforms. By utilizing air-dropped expendable sonobuoys and linking with the Australian Hydro Acoustic Communications Link (HAIL) system, which is also undergoing FCT evaluation, this telemetry buoy promises to be a valuable Navy netcentric warfare asset. The project is being conducted by the Submarine Acoustics Systems Program (PMS-401), Program Executive Officer-Submarines at the Naval Sea Systems Command in coordination with the Air Anti-Submarine Warfare Systems Office (PMA-264) of the Naval Air Systems Command at Patuxent River, Maryland. Technical test support is being provided by the Naval Undersea Warfare Center at Keyport, Washington and Sparton Electronics, headquartered in Jackson, Michigan, the leading supplier of sonobuoys to the U.S. Navy.



MARINE CORPS

40mm Low Velocity High Explosive Dual Purpose (HEDP) Improvement – Canada, Germany (joint with USSOCOM)

This joint Marine Corps and U.S. Special Operations Command project is evaluating an improved propulsion system, cleaner burning propellant, a self-destruct fusing mechanism, and improved Insensitive Munitions (IM) energetic technology when integrated into an improved low velocity 40mm HEDP cartridge for use in the M79 and M203 Grenade Launchers. *SNC Technologies of Canada* and *Rheinmetall of Germany* are the foreign manufacturer participants. A successful FCT will provide the warfighter with a more accurate and lethal HEDP cartridge for use against a broad spectrum of targets while improving shipboard safety with improvements in IM characteristics of the current rounds. The project is being managed by the Program Manager for Ammunition, Marine Corps Systems Command at Quantico, Virginia. Technical tests are being conducted at the Naval Surface Warfare Center in Dahlgren, Virginia.



Highly Mobile Oxygen Supplementation System – Canada



This project is evaluating a lightweight battery-powered oxygen supplementation system which is fielded to Canadian Armed Forces and is in use within the Canadian health system. Developed by the *University Health Network of Toronto*, the “HMO²SS” is an oxygen-breathing mask that provides increased oxygen therapy in mass casualty medical care, lasting 8 to 12 times longer than current masks. Currently there are no domestic systems in production to meet the Marine Corps’ requirements. A successful FCT with U.S. Food and Drug Administration approval for fielding will result in medical units needing fewer heavy oxygen bottles when deployed without negatively affecting their current mission for mass casualty medical care. The project is being managed by the Combat Equipment & Support System, Nuclear, Biological, & Chemical Defense Systems, Marine Corps Systems Command at Quantico, Virginia. Orthopedic Research Associates of Fredericksburg, Virginia; the Mountain Warfare Training Center in, Bridgeport, California; and the Naval Medical Research Center in Silver Spring, Maryland, is conducting the technical testing.

M16A2/M4 Training Bolt – Canada

This project is evaluating the M16A2/M4 training bolt manufactured by *SNC Technologies of Canada* which is designed to fire the Special Effects Small Arms Marking System (SESAMS) training cartridge. The Canadian item, which is in service with



Canadian, Japanese, Swedish, and British Armed Forces, could replace the current SESAMS upper receiver for the M16A2 and M4 Service Rifles. A successful FCT will allow Marines to fire at short range low-velocity marking ammunition for urban terrain training. The test program is being managed by the Marine Corps Systems Command at Quantico, Virginia, with technical test support from the Naval Surface Warfare Center in, Crane, Indiana, and operational test activities by the Marine Corps’ Program Manager for Training Systems at the Ordnance Test Facility, Marine Corps Base, Quantico, Virginia.

Multi-Spectral Camouflage Netting – Canada, Israel, Sweden



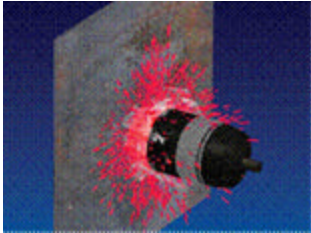
This project is evaluating new two-sided multi-spectral camouflage nets from *Fibrotex, Ltd. of Israel*, *GMA Cover Corp. of Canada*, and *Saab Barracuda LLC of Sweden*. A successful FCT will allow the Marine Corps to employ ground forces with “one net” that is capable of two different camouflage patterns. The result is a significant reduction in purchase quantity, cost, logistical transportation, and storage requirements in addition to being able to field the full camouflage capability in a much shorter time. The project is being managed by the Marine Corps Systems Command’s NBC Programs Directorate with technical testing to be conducted at the Chemical Laboratory at White Sands Missile Range in New Mexico.



U.S. SPECIAL OPERATIONS COMMAND

40mm Tactical Marking, Day/Night Training Cartridges – Germany (joint with Army)

This project is evaluating two 40mm low-velocity cartridges for multi-service use: an infrared (IR) tactical marking cartridge and a 40mm day/night training cartridge. The candidates are both manufactured by *NICO Pyrotechnik of Germany* and both use unique chemi-luminescent marking technology. The 40mm tactical marking cartridges provide for accurate IR target marking to support precision fire control and air-ground combat in daylight and at night time. The 40mm day/night training cartridges allow soldiers to train using their night vision goggles, a capability that is not currently available. The project is being executed in two segments under U.S. Special Operations Command lead. The Naval Surface Warfare Center at Dahlgren, Virginia, will lead qualification of the 40mm tactical marking cartridge. The Army's Research, Development and Engineering Center at Picatinny Arsenal, New Jersey, will upgrade the current M781 day cartridge with the German day/night training technology.



70mm Multi-Purpose Penetration (MPP) Warhead – Norway



This project is evaluating an improved 70mm MPP warhead developed by *NAMMO of Norway*, for use by Special Operations Aviation Regiment (AH-6J) aircraft. This warhead will provide special operations forces with a significant new capability to defeat hardened targets such as building, bunkers, and other structures. The NAMMO warhead is in service with Danish and Norwegian Air Forces and Apache Helicopter units of the British Army. The current family of Hydra Rocket warheads which were developed over 40 years ago, with no significant upgrades undertaken over this time period, uses high explosive (non-penetrating) warheads with quick-acting point-detonating fuses and do not meet service objective penetration requirements. The test program is being conducted by the Army's Research, Development and Engineering Center at Picatinny Arsenal, New Jersey, in coordination with the 160th Special Operations Aviation Regiment at Fort Campbell, Kentucky.

84 mm Multi-Target Warhead – Sweden

This project is evaluating an 84mm Multi-Target Warhead developed by *Saab Bofors Dynamics, of Sweden*, for use in the Multi-Role Anti-Armor, Anti-Personnel System (MAAWS), the primary Special Operations Forces' crew-served shoulder-fired weapon. This warhead is optimized for use in urban/built up area and will defeat various types of structures and targets using a tandem warhead with a follow-through charge and could greatly enhance the capability of Special Forces during operations in urban environments. The test program is being conducted by the Army's Research, Development and Engineering Center at Picatinny Arsenal, New Jersey, supported by elements of the 75th Ranger Regiment at Fort Benning, Georgia.



Close Quarter Battle Pistol – Austria, Germany, Italy, Switzerland

This project is evaluating pistols that have the ability to fire multiple caliber rounds, weight less than 40 ounces, and improved accuracy, reliability and ergonomics. The objective will be to replace the legacy SIG Sauer P226 battle pistol used by Special Operations Forces for the past 15 years. Candidates expected to participate in the project are from:



Steyr/Mannlicher and Glock of Austria, Heckler and Koch of Germany, Beretta of Italy, and SIG Sauer of Switzerland. The test program will be conducted by the Naval Special Warfare Development Group and the Naval Surface Warfare Center at Crane, Indiana, and at the Blackwater Test Facility in Moyock, North Carolina. Operational testing will be accomplished by the Marine Corps Programs Department, Fallbrook, California, at ranges at Camp Billy Machen Navy SEAL Training Facility in Slab City, California; Camp Pendleton, California; and San Clemente Island, California.

Tethered Balloon ISR Platform – Norway

This project is evaluating a means of employing a unique Intelligence, Surveillance, and Reconnaissance (ISR) sensor communications package, developed by *Tyra Invest AS of Norway* and currently in service with Norwegian military forces, using a tethered balloon platform. If proven viable, this cost-effective material solution will provide Special Operations Forces a new capability that will significantly improve tactical situation awareness in the mission



objective to find, fix, and destroy the enemy and simultaneously provide friendly force protection. The test program is being conducted by the Joint Tactical Warning and Legacy Force Protection Systems Program Office and the Airborne Special Operations Test Directorate at Fort Bragg, North Carolina, with technical test assistance from the Space and Naval Warfare Systems Center in Charleston, South Carolina.

APPENDIX A

PARTICIPATION IN THE FCT PROGRAM

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METRICS, MEASURES OF SUCCESS

The Foreign Comparative Testing Program assembles and “tracks” five primary metrics intended to measure the health, success, and cost effectiveness of the program. The results of this effort are presented and discussed in the following Appendices.

1. Successfully completed projects that lead to U.S. procurements (Appendices A and B)
 - a. Value and quantities of procurements, including follow-on (multi-year) buys
 - b. Percentage procured of those meeting sponsor requirements and providing best value
 - c. Country participation, including number of projects; OSD funding provided to the sponsor for execution; percentage of overall funding comparisons; number, value and year of procurements
 - d. Service and Special Operations Command participation, including number of projects conducted, completed; number of projects meeting requirements; procurements
 - e. Location and identification of project management and testing activities (Appendix D)
2. Cost-benefit estimates for successful projects (Appendix D)
 - o Development cost avoidance
 - How much it would have cost the U.S. to develop and field the item on its own, in the absence of the FCT Program
 - o Production cost savings
 - Actual or later-expected reductions in per unit cost as a result of FCT
 - o Operations and life-cycle cost savings
 - Savings expected to be achieved from longer life, less maintenance cost, or the item’s efficiency
 - o Reduced fielding time
 - The ability to field the qualified item to the warfighter sooner, as compared to traditional development and acquisition efforts
3. Evidence of military and other operational employment, improved operational capabilities (Appendix C)
4. Industrial teaming opportunities, including domestic partner’s technology area and location (State, Congressional District) (Appendix D)
5. Licensed production in the U.S. (Appendix D)

PARTICIPATION IN THE FCT PROGRAM BY COUNTRY

The FCT Program depends for its success on the participation of our allies' and other friendly nations' defense industries and their world-class products. Table A1 lists the countries that participated in the FCT Program from FY 1980 through the beginning of FY 2005, along with the OSD FCT funds provided to the Services and U.S. Special Operations Command to evaluate the products from these countries. Numerous FCT projects involved equipment from two or more countries; thus, the total from column 2 will be greater than the number of total FCT projects that the FCT Program tracks. In addition, some FCT projects have resulted in the procurement of multiple items; thus, the number of items selected for procurement is greater than the number of projects shown in Table A2.

Table A1. Country Participation in the FCT Program ⁴

Country	Number of FCT Projects	FCT Funds Provided (\$ million) ⁵	Number of FCT Items Selected for Procurement	Value of Procurements (\$ million)
Australia	25	22.3	5	172.4
Austria	12	5.6	0	0
Belgium	18	7.5	3	18.9
Canada	65	63.4	15	216.0
Denmark	15	13	7	102.3
Finland	7	3.3	1	4.7
France	75	96.9	15	589.0
Germany	109	142.3	26	1,051.5
Iceland	1	0.6	0	0
India	1	1.0	1	1.5
Israel	62	60.3	12	740.0
Italy	20	20.6	1	4.2
Japan	7	3.2	1	0.2
Netherlands	17	16.7	0	0
New Zealand	1	0.2	0	0
Norway	30	32.9	7	506.5
Poland	2	3.4	0	0
Republic of South Africa	6	8.9	3	95.7
Republic of Korea	8	3.1	0	0
Russian Federation	7	15.6	3	30.9
Singapore	1	0.9	0	0
Sweden	58	96.8	19	929.3
Switzerland	16	9.1	3	51.3
Taiwan	1	0.2	0	0
Ukraine	1	1.3	0	0
United Kingdom	193	301.5	51	2,426.2
Totals	758	930.6	173	6,940.6

⁴ Table A1 includes projects conducted under the former OSD Foreign Weapons Evaluation (FWE) and NATO Comparative Testing (NCT) Programs between 1980 and 1989.

⁵ Funds are shown in FY 2004 constant year dollars.

DoD PARTICIPATION IN THE FCT PROGRAM

The principal objective of the FCT Program is to equip the U.S. warfighter with the world's best equipment by evaluating those mature conventional defense items and technologies produced by allied and coalition partner nations which demonstrate the potential to satisfy U.S. military requirements more quickly and economically. Table A2 lists the participation of each of the Services and the U.S. Special Operations Command in the FCT Program through the beginning of FY 2005.

Table A2. DoD Participation in the FCT Program, FY 1980 – 2005

Sponsor	Total Projects FY 1980 to 2005	Projects Completed in 2003/2004	Projects Continuing from Previous Years, and Started, in FY 2003/04	Total Projects Meeting Requirement FY 1980-2004 ⁶	Total Projects Resulting in Procurement ⁷
Army	161	12	1/9	80	53
Navy	170	7	4/9	65	45
Marine Corps	57	8	2/10	24	17
Air Force	102	6	1/6	48	30
USSOCOM ⁸	39	14	1/6	21	19
Totals	529	47	-	238	164

From 1980 through the beginning of FY 2005, procurements resulted from about 69% of the projects that were completed successfully, met the sponsor's requirements, and provided best value. With better definition of user requirements and a clear focus on testing those items that address funded needs, the procurement rate of those items successfully completing FCT test and evaluation and meeting U.S. requirements since 1995 has risen to about 80%.

⁶ This number does not include projects that were technical assessments, failed the evaluation, or were terminated.

⁷ Number represents projects sponsored by the Services or Special Operations Command that resulted in procurements through October 2004.

⁸ The first USSOCOM project was initiated in FY 1995 and was funded through the Navy's FCT Office. Beginning in FY 1997, USSOCOM directly managed its own FCT projects rather than relying on the Services to propose and receive funding from OSD for projects that related to USSOCOM requirements.

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APPENDIX B

**EQUIPMENT SELECTED FOR PROCUREMENT
AS A RESULT OF THE FCT PROGRAM**

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Table B1. Equipment Procured by the Army⁹

EQUIPMENT	COUNTRY	MANUFACTURER	YEAR
Fly-Away SATCOM System	Sweden	SweDish	2004
AT-4CS Confined-Space Anti-Armor Weapon	Sweden	Saab Bofors Dynamics	2004
Prophet Ground Tactical-Based SIGINT-ES Architecture	United Kingdom	QinetiQ	2003
Improved Battery Cells	Canada	Moli Energy	2003
Antenna Masts for Tactical Communications	Finland	Mast Systems	2002
Optically-Improved Standard Advanced Dewar Assembly II	France	SOFRADIR	2002
Anti-Jam GPS (GAS-1N) for Army Comanche EMD	United Kingdom	Raytheon, Ltd.	2002
Scanner Assembly for HTI B-Kit	United Kingdom	BAE Systems	2002
Afocal Assembly for HTI B-Kit	United Kingdom	BAE Systems	2002
High Mobility Engineer Excavator	Australia	Australian Defense Industries	2002
Mine Protected Clearance Vehicle (Buffalo)	South Africa	Denel-Mechem	2002
Anti-Jam GPS (Global Positioning) for Comanche EMD	United Kingdom	Raytheon Systems, Ltd.	2002
1.75/1.5-Watt Linear Drive Cooler	Germany	AEG Infrarot Modules	2001
7.62mm Short Range Training Ammunition	Canada	SNC Technologies	2001
L96/L97 Anti-Riot Grenade for LVOSS	United Kingdom	Pains-Wessex Defence	2001
Ground and Vehicle Mounting Systems for LRAS3	Germany	Sachtler GmbH	2000
Standard Advanced Dewar Assembly (SADA)-Type II	France	SOFRADIR	1999
Improved Mobile Subscriber Equipment UHF Radios	Canada, Israel	Canadian Marconi, Tadiran	1998
Powered Multi-Fuel Burner	Canada	Thermal Research	1998
Leguan Heavy Assault Bridge	Germany	MAN Technologies AG	1998
Gun Laying and Positioning System	Switzerland	Leica Heerbrugg	1998
Automatic Chemical Agent Detector Alarm Power Supply	United Kingdom	Smiths (Graseby Dynamics)	1998
Interim Vehicle-Mounted Metallic Mine Detector	South Africa	Dorbyl/RSD	1997
1-Watt Linear Drive Cooler	Germany	AEG Infrarot Modules	1997
Ultra-Lightweight Camouflage Net System	Sweden	Diab-Barracuda	1997
2kW Generator Sets for Mobile Electric Power	Canada	Mechron	1996
Automatic Chemical Agent Detector Alarm	United Kingdom	Smiths (Graseby Dynamics)	1996
Long Wavelength Infrared Focal Plane Arrays	France	SOFRADIR	1995
Muzzle Velocity System	Israel	Reshef	1995
84mm HEDP Round for Carl Gustaf RAAWS	Sweden	Saab Bofors Dynamics	1994
60mm Mortar Training Cartridges and Refurbishment Kits	Israel	Salgad/Pocal	1993
HAWK Battery Loader-Transporter Modification Kit	Germany	Thyssen Nordseewerke	1993
Improved Chemical Agent Monitor (ICAM) and Retrofit Kits	United Kingdom	Smiths (Graseby Ionics)	1993
35mm Tank Precision In-Gunbore Device HEAT Rounds	Germany	Diehl	1991
Anti-Magnetic Mine Actuating Device	Israel	Israeli Aircraft Industries	1990
Carl Gustaf M3 (RAAWS)	Sweden	Saab Bofors Dynamics	1990
Digital Signal Processor	Denmark	Weibel	1990
Fox NBC Reconnaissance Vehicle (NBCRS)	Germany	Thyssen Henschel	1990
NBCRS Lane Markers	Germany	F. Diehl	1990
NBCRS Mass Spectrometer	Germany	Bruker Franzen/Diehl	1990
NBCRS Navigation Instrument	Germany	Teldix	1990
105mm Lightweight howitzer M119	United Kingdom	Royal Ordnance	1988
105mm Tank Gun Training Ammunition	Germany	Rheinmetall	1986
81mm Mortar Training Cartridge and Refurbishment Kit	Israel	Salgad/Pocal	1985
Improved 81mm Mortar and Ammunition	United Kingdom	Royal Ordnance	1985
120mm Mortar (Tampella)	Israel	Soltam	1985
Chemical Agent Monitor (CAM)	United Kingdom	Smiths (Graseby Ionics)	1985
Kinetic Energy Recovery Rope	United Kingdom	Marlow Ropes, Ltd.	1985
5.56mm Plastic Training Ammunition with Bolt	Germany	Dynamic-Nobel	1984
Potable Water Tank	United Kingdom	Airborne Industries	1984

⁹ Year of first procurement is as shown. Because more than one Service may procure an item, total numbers of the projects listed in the tables in Appendix B will not match those totals shown in Table A2.

SANATOR Decontamination Unit	Norway	Karl H. Hoie/EASI	1984
4.2" Mortar Training Devices/Rounds	Germany	Nico Pyrotechnik	1983
.50 Caliber Plastic Training Ammunition with Device	Germany	Dynamit-Nobel	1983
AT-4 Anti-Armor Weapon	Sweden	Saab Bofors Dynamics	1983
Small Unit Support Vehicle	Sweden	Haaglands & Soner	1983
.22 Caliber Tank Training Ammunition	United Kingdom	EMI Eley	1982
10 Ton Truck Transporter Vehicle	Germany	MAN GHH	1981
Combat Support Boat	United Kingdom	Fairey Allday Marine	1981
M72A3 LAW Anti-Tank Weapon	Norway	Raufoss	1981
NBC Marking Set	Germany	A. Diedr Dolmeyer	1981

Table B2. Equipment Procured by the U.S. Marine Corps

EQUIPMENT	COUNTRY	MANUFACTURER	YEAR
Biocular Image Control Unit for M1A1 Tank	United Kingdom	Brimar	2004
JSLIST Alt. Footwear (Protective Boots) (Urgent)	Canada	Acton International	2004
High Rate-of-Fire .50 Cal Machine Gun	Belgium	FN Herstal	2004
Mine Plow and Lane Marking for Assault Breacher	United Kingdom	Pearson Engineering	2003
Communications Distribution System	Canada	Computing Devices	2003
L96/L97 Anti-Riot Grenades for LVOSS	United Kingdom	Pains Wessex Defence	2002
40mm Training Practice Cartridge MK281Mod0)	Germany	Nico Pyrotechnik	2002
30mm APFSDS Tracer Rounds for USMC EFV	Germany, Norway	Mauser, Raufoss	2001
Joint Service Combat Shotgun	Italy	Benelli	2000
MTU-883 Diesel Engine for EFV	Germany	Motoren und Turbinen Union	1999
Aluminum Road Wheels for EFV	United Kingdom	GKN	1999
Digital Voice and Data System	Canada	Computing Devices	1998
NBC Analysis System	Denmark	Bruhn NewTech	1998
Minimum Operating Strip Lighting Kit	United Kingdom	Metalite Aviation Lighting	1998
Automatic Chemical Detector Alarm Power Supply	United Kingdom	Smiths (Graseby Dynamics)	1998
2KW Generator Set for Mobile Electric Power	Canada	Mechron	1997
Automatic Chemical Agent Detector Alarm (ACADA)	United Kingdom	Smiths (Graseby Dynamics)	1997
84mm Insensitive Munition HEAT Round for RAAWS	Sweden	Saab Bofors Dynamics	1996
Airtronic Light Oil Burner	Sweden/Luxembourg	Electrolux	1995
M72A3/A5 Light Anti-Tank Weapon	Norway	Raufoss/Talley Defense	1995
HAWK Battery Loader-Transporter Modification Kit	Germany	Thyssen Nordseewerke	1993
Improved Chemical Agent Monitor (ICAM)	United Kingdom	Smiths (Graseby Dynamics)	1993
Portable Target Scoring System	United Kingdom	BDL Systems, Ltd.	1992
Anti-Magnetic Mine Actuating Devices	Israel	Israel Aircraft Industries	1990
Lightweight CB Protective Garment	United Kingdom	Compton-Webb Ltd.	1990
"Fox" NBC Reconnaissance Vehicle (NBCRS)	Germany	Thyssen Henschel	1990
NBCRS Lane Markers	Germany	F. Diehl	1990
NBCRS Mass Spectrometer	Germany	Bruker Franzen/F. Diehl	1990
NBCRS Navigation Instrument	Germany	Teldix	1990
A-6 Raster Head-Up Display	United Kingdom	GEC Avionics	1988
Chemical Agent Monitor (CAM)	United Kingdom	Smiths (Graseby Dynamics)	1985
SANATOR Decontamination Unit	Norway	Karl H. Hoie	1984

Table B3. Equipment Procured by the Navy

EQUIPMENT	COUNTRY	MANUFACTURER	YEAR
JSLIST Alternative Footwear (urgent procurement)	Canada	AirBoss Defence (nee Acton)	2004
VLF/LF Composite Bushing Replacement	Switzerland	Tyco Electronics	2003
Corona Monitoring System	OFIL, CSIR	Israel, South Africa	2003
Expeditionary Airfield Light Duty Mat (Mobi-Mat)	France	Deschamps	2002
Stealth Screen System	France	ACH Engineering	2002
Joint Protective Aircrew Ensemble	Germany	Blucher & Theodolf Fritsche	2002
BROACH Warhead for Joint Standoff Weapon	United Kingdom	BAE Systems	2001
Emergency Evacuation Hyperbaric Stretcher	United Kingdom	SOS, Ltd.	2001
High Pressure Pure Air Generator for F/A-18E/F	United Kingdom	Ultra Electronics	2001
Titanium Nitride Erosion-Resistant Coatings Process	Canada/Russia	MDS/PRAD	2001
Communications Faired Mast	United Kingdom	Thomson Marconi Sonar	2000
DYAD Magnetic Sweep	Australia	Australian Defense Industries	2000
HMX Explosives Compounds	Norway	Dyno Nobel	2000
Passenger Anti-Exposure Survival System	United Kingdom	Multifab Survival	2000
Submarine Escape and Immersion Ensemble	United Kingdom	Beaufort/Hale Hamilton	2000
Atmospheric Diving Suit (Newtsuit)	Canada	International Hard Suit	1999
ACADA Power Supply	United Kingdom	Smiths (Graseby Dynamics)	1998
2kW Generator Set for Mobile Electric Power	Canada	Mechron	1997
Automatic Chemical Agent Detector Alarm (ACADA)	United Kingdom	Smiths (Graseby Dynamics)	1997
Acoustic Cladding Underwater Repair System	United Kingdom	UMC International	1997
MA-31 Supersonic Sea Skimming Target Missile	Russia	Zvezda Strela	1997
84mm Insensitive Munition HEAT Round for RAAWS	Sweden	Saab Bofors Dynamics	1996
Digital Flight Control System for F-14	United Kingdom	GEC Marconi	1996
GIANT Infrared Decoy System	Germany	Buck Technologies	1996
T-45 Trainer Digital Cockpit Display	United Kingdom	Smiths Industries	1996
Long Wavelength Infrared Focal Plane Arrays	France	SOFRADIR	1995
Forward Area Degaussing Range	United Kingdom	Ultra Electronics	1995
High-Pressure Pure Air Generator for AV-8B & AH-1	United Kingdom	Ultra Electronics	1995
IFF Tracker System for EW Training	United Kingdom	Cossar	1995
M72A3/A5 Light Anti-Tank Weapon	Norway	Raufoss/Talley Defense	1995
Spray-Formed Alloy 625 Process for Submarine Piping	Sweden	AB Sandvik Steel	1995
BOL Chaff Countermeasures System	Sweden/UK	Saab Tech/Chemring	1993
Cowan Transportable Recompression Chamber	Australia	Cowan Manufacturing	1993
Impressed Current Cathodic Protection System	United Kingdom	Widney Aish	1993
Improved Chemical Agent Monitor (I-CAM)	United Kingdom	Smiths (Graseby Dynamics)	1993
EHF Traveling Wave Tubes	Germany	Siemens	1992
MK48 Torpedo Wire Guidance (Hosepipe)	United Kingdom	Marconi Underwater Systems	1992
SAM Remote-Controlled Minesweeper	Sweden	Karlskronavarvet	1991
Penguin Missile & Guidance Unit	Norway	Norsk Teknologi	1991
Infrared Imaging System	Israel	El-Op, Tadiran	1991
Aerial Target Vector Scoring	United Kingdom	Cambridge Consultants	1990
MCM-1 Tactical Displays	United Kingdom	Plessey Naval Systems	1990
Night Vision Goggles (Cats Eyes)	United Kingdom	GEC Avionics	1990
TICM FLIR with Thermal Cueing Unit	United Kingdom	GEC Avionics	1990
A-6 Raster Head-Up Display	United Kingdom	GEC Avionics	1988
ASW Acoustic Processor	Canada	Computing Devices	1988
E-2C Multifunction Control Display Unit	Canada	Marconi of Canada	1988
Maritime Decoy (Rubber Duck)	United Kingdom	Irvin Industries	1988
Versatile Exercise Mines	United Kingdom	BAeSEMA	1987
Chemical Agent Monitor (CAM)	United Kingdom	Smiths (Graseby Dynamics)	1985
SANATOR Decontamination Unit	Norway	Karl H. Hoie	1984

.50 Cal. Multipurpose Ammunition	Norway	Raufoss	1981
Combat Support Boat	United Kingdom	Fairey Allday Marine	1981
Integrated Communications System III	United Kingdom	Marconi	1980

Table B4. Equipment Procured by the U.S. Special Operations Command

EQUIPMENT	COUNTRY	MANUFACTURER	YEAR
MC-130H Aerial Refueling Pod System	United Kingdom	Flight Refuelling Limited	2004
Parachute Leaflet Delivery System (WSADS)	Canada	MMist	2004
Fly-Away SATCOM (Satellite Communications)	Sweden	Swe-Dish	2003
Man-Portable Multi-Sensor System Headsets and Sensors	Denmark, France, Israel, Sweden	NextLink, Metravib, Source of Sound, FLIR Systems	2003
Chemical Protective Gloves	Canada	Cloutier	2003
7.62mm Lightweight Machine Gun MK48	Belgium	FN Herstal	2003
40mm Training Practice Cartridge MK281Mod0)	Germany	Nico Pyrotechnik	2002
Joint RAAWS Upgraded Ammunition-Phase II	Sweden	Saab Bofors Dynamics	2002
AT-4CS Confined-Space Anti-Armor Weapon	Sweden	Saab Bofors Dynamics	2002
Man-Portable Decontamination Equipment	Germany	Odenwald-Werke Rittersback	2002
Patrol Coastal Decoy System (Super Barricade)	United Kingdom	ML Aviation	2002
21mm Trainer for M72 Light Anti-Armor Weapon (LAW)	Norway	Nordic Ammunition Co.	2001
Joint RAAWS Upgraded Ammunition-Phase I	Sweden	Saab Bofors Dynamics	2001
5.56mm Lightweight Machine Gun	Belgium	FN Herstal	2000
Maritime Craft Air Deployment System II	United Kingdom	Aircraft Materials, Ltd.	1999
Gunfire Detection System-PILAR	France	Metravib	1999
Maritime Craft Air Deployment System	United Kingdom	Aircraft Materials, Ltd.	1998
Long Wavelength Infrared Focal Plane Arrays	France	SOFRADIR	1995
Carl Gustaf M3 Ranger Anti-Armor Weapon (RAAWS)	Sweden	Saab Bofors Dynamics	1994
LI-465 Fuzes for PGU-9AB Ammunition	Sweden	Saab Bofors Dynamics	1993
40mm HEI Round (PGU-37B) for AC-130 Gunship	Sweden	Saab Bofors Dynamics	1993

Table B5. Equipment Procured by the Air Force

EQUIPMENT	COUNTRY	MANUFACTURER	YEAR
Eagle Vision Sensor Upgrade (SPOT5)	France	EADS (Matra Cap)	2004
Retractable Arresting Cable System	France	Aératur (Zodiac Group)	2002
Infrared/UV Threat Stimulator	United Kingdom	Elettronica UK, Ltd.	2001
Emergency Evacuation Hyperbaric Stretcher	United Kingdom	SOS, Ltd.	2001
F-15 Countermeasures Dispenser (BOL)	Sweden	Saab Tech (formerly Celsius)	2001
Emergency Aircraft Arresting System	France	Aératur (Zodiac Group)	2000
Next Generation Small Loader	Australia	Static Engineering with FMC	2000
Uncooled Thermal Imager	Sweden	FLIR Systems	1999
Renaissance View Satellite Data Upgrade	France, Canada	EADS, IOSAT of Canada	1999
600-Gallon Fuel Tanks for F-16	Israel	Israel Aircraft Industries	1999
Eagle Vision and Eagle Vision with LANDSAT Upgrade	France	EADS (formerly Matra CAP)	1998
Automatic Chemical Agent Detector Alarm Power Supply	United Kingdom	Smiths (Graseby Dynamics)	1998
Electronic Warfare Management System	Denmark	Terma	1997
Multi-Scanner for Aging and Surveillance	Germany	Fiedler Optoelectronik Ltd.	1997
MILSTAR Traveling Wave Tube	France	Thomson Tubes Electroniques	1997
Pressure Sensitive Paint for Wind Tunnel Applications	Russia	OPTROD, Ltd.	1996
Automatic Chemical Agent Detector Alarm (ACADA)	United Kingdom	Smiths (Graseby Dynamics)	1996
Modular Reconnaissance Pod	Denmark	Per Udsen (Terma)	1996
Long Wavelength Infrared Focal Plane Arrays	France	SOFRADIR	1995
Enhanced Electronic Warfare Scenario Generator	United Kingdom	Data Sciences	1994
Pylon Integrated Dispenser	Denmark	Per Udsen (Terma)	1993

I-800 (HAVE NAP) Warhead	Israel	Israel Military Industries	1992
SPOT Satellite Digital Imagery	France	SPOT Image Corporation	1990
ALE-40 Digital Sequencer Switch	Denmark	Terma Elektronik	1990
NBC Aircrew Protective Suit Fabric	Germany	Blucher/Celanese Corp.	1990
Millimeter Wave Communications	Japan	Nippon Electric	1989
Dielectric Measurement Equipment	France	Aérospatiale	1989
HAVE NAP Stand-Off Weapon	Israel	Rafael	1989
Munitions Ejector Release Unit	Germany	Alkan/EDO	1986
Chemical Agent Monitor	United Kingdom	Smiths (Graseby Dynamics)	1985
Rapid Runway Repair Equipment	Germany	Christiansen Diamond Products	1985
SANATOR Decontamination Unit	Norway	Karl H. Hoie/EASI	1984
DURANDAL Runway Attack Weapon	France	Matra	1983
10 Ton Truck Transporter Vehicle	Germany	MAN GHH	1981

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APPENDIX C

**FCT-EVALUATED EQUIPMENT
SUPPORTING MILITARY OPERATIONS
AND
IMPROVED CAPABILITIES**

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EXAMPLES OF FCT-EVALUATED EQUIPMENT
DEPLOYED IN U.S. OPERATIONS

- Operation:** Iraqi Freedom
Project: 5.56mm Lightweight Machine Gun
Country: Belgium
Manufacturer: FN Herstal
Description: The MK46 Mod0 is a compact, belt-fed machine gun manufactured by FN Herstal of Belgium that significantly increases the organic firepower of U.S. Special Forces SEAL platoons without affecting tactical load bearing constraints. Substantially lighter than the 7.62mm MK43 machine gun and M249 squad automatic weapons in the inventory; the MK46 is highly reliable and remarkably flexible with improved rails for scope, laser, and light attachments. Full operational capability was obtained in July 2002 when 492 weapons were delivered to Special Forces. The weapon is being used extensively in Iraqi Freedom combat operations.
- 
- Operations:** Enduring Freedom, Iraqi Freedom
Project: Advanced Demolition Weapons
Country: Sweden, Germany
Manufacturer: Saab Bofors Dynamics, Diehl Munitions GmbH
Description: In January 2002, U.S. Special Operations Command completed evaluation of the Swedish AT-4CS (Confined Space 84mm shoulder-fired weapon) developed by Saab Bofors Dynamics, and the Bunkerfaust (lightweight fortification defeat weapon) developed by Diehl Munitions GmbH, for urgent deployment to Afghanistan and to Iraq, the first fielding of a confined space shoulder-fired system to U.S. Forces. As of March 2005, over 6,000 AT-4CS weapons have been procured.
- 
- Operations:** Bosnia, Kosovo
Project: Anti-Riot Grenade
Country: United Kingdom
Manufacturer: PW Defence, Ltd. (formerly Pains-Wessex)
Description: Army Military Police and other selected small units on patrol duty in Bosnia and Kosovo, deployed with the Light Vehicle Obscuration System (LVOSS), were equipped with L96/97 anti-riot grenades to employ as required as a less-than-lethal counterforce for crowd control and/or riot suppression operations.
- 

Operations: Kosovo, Enduring Freedom, Iraqi Freedom

Project: Automatic Chemical Agent Detector Alarm (ACADA)

Country: United Kingdom

Manufacturer: Smiths Detection (formerly Graseby Dynamics)

Description: The GIDS-3 was selected as the winning candidate for the Automatic Chemical Agent Detector Alarm requirement in 1996. The sensitive detectors are emplaced for remote detection and add a nerve agent capability that the previous M43A1 detector does not possess. An advanced Power Supply for ACADA, with improved unit reliability and significant weight reduction, was qualified under FCT in FY 1998 and is being procured with each ACADA unit. ACADA is the standard detector for all Army units and is currently deployed worldwide and also is in use to protect domestic high-value installations, including the Pentagon. Over 32,000 units have been procured to date. The M22 ACADA is deployed with the following units in support of either Enduring Freedom or Iraqi Freedom: 3rd ID, Fort Stewart; 101st Airborne Division, Fort Campbell; 82nd Airborne Division, Fort Bragg; 4th ID and 1st Cavalry, Fort Hood; 10th Mountain Division, Fort Drum; and various Special Forces units.



Operations: Enduring Freedom, Iraqi Freedom

Project: BOL Countermeasures Dispenser and Expendables Deployed with F-14 Tomcat

Country: Sweden

Manufacturer: Saab Bofors Dynamics

The Swedish Saab Bofors Dynamics BOL Chaff Dispenser with chaff and flare expendables, qualified for procurement and installation on Navy F-14 Tomcats under the FCT Program, is deployed in the Iraqi theater of operations with Carrier Air Wing 14 aboard the USS Carl Vinson (CVN-70). Air Wing pilots and commanders in after action reports have stated, *“The installation of BOL Chaff is arguably one of the best survivability enhancements for the Tomcat in it’s history...we finally have incorporated a system on Navy Tactical Aircraft giving our aircrews a reasonable number of expendables for combat.”*



Operations: Midwest Flood Assistance (1997), Bosnia

Project: Combat Support Boats

Country: United Kingdom

Manufacturer: Fairey Allday Marine

Description: During the serious floods in the Midwest in the late spring and summer of 1997, the U.S. Army and Army National Guard engineer units provided support to state and local officials. Combat Support Boats were used for recovery operations, transporting supplies, and assisting in the repair and construction of bridges. In Bosnia, the flood-swollen Sava River was a major obstacle to accomplishing U.S. national security objectives. Combat Support Boats were essential to rapidly assembling and maintaining the military bridge that U.S. forces used to cross the Sava River into Bosnia.



Operations: Desert Storm, Somalia, Bosnia, Kosovo, Enduring Freedom, Iraqi Freedom
Project: Eagle Vision Satellite Imagery Receiving and Processing Ground Station, SPOT Satellite Digital Imagery

Country: France, Canada

Manufacturer: SPOT Image Corporation, EADS (formerly Matra CAP), IOSAT Corporation

Description: SPOT satellite imagery was down-linked directly to U.S. Forces in Bosnia and is currently being used in support of Enduring Freedom and Iraqi Freedom operations. SPOT provides U.S. Air Force pilots with imagery that allows near real-time practice flyovers and provides ground commanders with valuable intelligence data in support of mission planning. Frequently, according to after-action reports during Operation Desert Storm, these were the only up-to-date images available to pilots prior to their air strike missions. Eagle Vision is also routinely used in support of exercises such as Cope Thunder and Green Flag and is currently on deployment.



Operation: Iraqi Freedom

Project: Electronic Warfare Management System AN/ALQ-213(V)

Country: Denmark

Manufacturer: Terma AS

Description: The AN/ALQ-213(V) EWMS manufactured by Terma Elektronik AS is an integrated and programmable electronic warfare unit which replaces individual cockpit controls with centralized control of the electronic combat suite (EC) in the F-16 Fighting Falcon and A-10 Warthog aircraft. This includes up-front presentation of all EC status, in-flight selection of chaff/IR dispense programs and full night-vision capability. The system is operational on all F-16 and A-10 aircraft, including those flying combat missions in Iraqi Freedom.



Operations: Enduring Freedom, Iraqi Freedom

Project: Expeditionary Airfield Light Duty Mat System

Country: France

Manufacturer: Deschamps

Description: The 1st Marine Expeditionary Forces deployed to Afghanistan and Iraq operating areas equipped with the "Mobi-Mat" system which gave them the capability to quickly set up stabilized landing areas for medical evacuation and Forward Ammo and Refueling Points for rotary-wing aircraft operations. The mats successfully completed FCT evaluation at the Naval Air Warfare Center in Lakehurst, New Jersey in 2002.



Operation: Iraqi Freedom
Project: Fly-Away SATCOM (Satellite Communications) System

Country: Sweden
Manufacturer: SweDish

Description: Small, lightweight satellite dishes manufactured by SweDish provide one-person operations in a turnkey satellite communications solution. Two sizes of small dishes provide secure communications (live video/audio streaming, broadband transmission and automated setup) without sacrificing the identity or location of the user. The unit in the photo is 5th Corps Headquarters during the early stages of Iraqi Freedom and the dish on the command and control vehicle is a 1.5M SweDish Drive Away System.



Operations: Bosnia, Kosovo, Desert Storm, 1996 Summer Olympics in Atlanta, Iraqi Freedom, and in Republic of Korea

Project: Fox NBC Reconnaissance Vehicle with MM-1 Mobile Mass Spectrometer

Country: Germany

Manufacturer: Thyssen-Henschel, Bruker-Franzen

Description: The XM-93 Fox NBC Reconnaissance Vehicle is equipped with state-of-the-art sensors and mass spectrometer for detecting chemical and biological agents. The Fox vehicle is deployed whenever there is a threat of chemical-biological warfare. The vehicle performed admirably during Operation Desert Storm and was used by U.S. forces in Bosnia and Kosovo to identify areas where munitions may have leaked. The Marines Corps' Chemical Biological Incidence Response Force (CBIRF) team out of the Naval Surface Warfare Center at Indian Head, Maryland, deployed with two Foxes to the 1996 Summer Olympics in Atlanta in readiness to provide support if required. The Fox was employed by Army and Marine Corps units in the assault on Baghdad during Operation Iraqi Freedom. Several Fox systems are also deployed elsewhere in the Middle East and are with U.S. troops in the Republic of Korea.



Operations: Joint Guardian, Enduring Freedom, Iraqi Freedom
Project: Ground and Vehicle Mounting System (GVMS)

Country: Germany

Manufacturer: Sachtler GmbH

Description: The GVMS is a proven advanced tripod/yoke assembly which permits operation of the Army's Long Range Advanced Scout Surveillance System (LRAS3), allowing smooth pointing of the sensors in both mounted and dismounted configurations. The GVMS is with units deployed with Task Force Falcon in support of Operation Joint Guardian, the NATO-led peacekeeping operation in Kosovo; U.S. Special Forces in Afghanistan; as well as fielded in Iraq with the 4th Infantry Division and 1st Cavalry Division both out of Fort Hood, Texas; and with the 1st Stryker Brigade Combat Team out of Fort Lewis, Washington. Additional GVMS systems are deployed to U.S. Forces in Kuwait.



Operation: Iraqi Freedom
Project: Gunfire/Counter-Sniper Detection System
Country: France
Manufacturer: Metravib
Description: The Metravib “PILAR” equipment which was qualified by the U.S. Special Operations Command under the FCT Program provides acoustic detection of gunfire and pinpoints the location of its origin in azimuth, elevation, and range out to 1,200 meters. The system reduces vulnerability to sniper threats in urban terrains, temperate and tropic environments. As noted earlier in this report, ground and vehicle-mounted variants are deployed with soldiers of the 101st Airborne Division in Iraq.



Operation: Iraqi Freedom
Project: Gun-Laying and Positioning System (GLPS)
Country: Switzerland
Manufacturer: Leica Heerbrugg
Description: GLPS significantly improves the warfighter's capability to quickly and accurately position and survey a battery of howitzers. By utilizing a global positioning system (GPS) receiver with satellite input, GLPS provides very accurate position and reduces gun-laying time by more than one-third. GLPS is currently deployed in Operation Iraqi Freedom.



Operation: Iraqi Freedom
Project: High Pressure Pure Air Generator (HiPPAG)
Country: United Kingdom
Manufacturer: Ultra Electronics Weapons System
Description: As described earlier in this review, HiPPAG replaces the nitrogen bottles used to cool Sidewinder missile seekers on Marine Corps AV-8B, AH-1 and Navy F/A-18E/F aircraft. Current flight operations with nitrogen bottles are costly and manpower-intensive to maintain, and due to capacity of the bottles, restrict the time the AIM-9M is available for self-protection/kill. HiPPAG is deployed with aviation units in Iraq, including the Navy's newest combat aircraft, the Boeing F/A-18E Super Hornet, which made its combat debut on 6 November, 2002, when aircraft from the Nimitz-class aircraft carrier *USS Abraham Lincoln* struck air-defense sites in southern Iraq.



Operations: Desert Storm, Bosnia, Kosovo, Enforcement of UN Sanctions on Iraq, Enduring Freedom, Iraqi Freedom

Project: Improved Chemical Agent Monitor

Country: United Kingdom

Manufacturer: Smiths Detection (formerly Graseby Dynamics)

Description: The Improved Chemical Agent Monitor (ICAM) is a hand-held point detector/monitor and can be used by personnel inspecting vehicles, buildings and other structures. The ICAM is the Army's standard monitor and is deployed in all theaters. U.S. inspectors on United Nations inspection teams in Iraq used the ICAM to identify areas where chemical munitions may have been produced, stored, or transported. U.S. Forces in Bosnia, Kosovo, Afghanistan and Iraq also employ the ICAM. Over 30,000 ICAMs have been produced for U.S. Forces.



Operation: Iraqi Freedom

Project: Interim High Mobility Engineer Excavator

Country: Australia

Manufacturer: Australian Defense Industries partnered with Oshkosh Trucks

Since November 2003, seven high mobility engineer excavators, manufactured by Australian Defense Industries in partnership with Oshkosh Trucks Corporation of Wisconsin, are deployed with Army units in Iraq. The production of the excavators for U.S. Forces was the result of a successful FCT evaluation in support of the Army Chief-of-Staff's Army Transformation Initiative to replace the slower Small Emplacement Excavator. The Australian equipment is C-130 deployable, all-wheel drive, diesel engine, with multiple attachment acceptability for back hoe and bucket loader, with a top speed of 70 miles per hour to stay up with forces on the move.



Operation: Iraqi Freedom

Project: Joint Service Combat Shotgun M1014

Country: Italy

Manufacturer: Bennelli

Description: This 12-gauge shotgun, the M4 Super 90 developed by Benelli Armi di Urbino, Italy, is replacing all pump-action shotguns currently in use by the Marine Corps with a common lightweight, highly reliable, semi-automatic weapon, significantly increasing individual firepower. The Marine Corps received the first 400 in November 2002 of a planned procurement of 3,997 weapons. 1st Marine Expeditionary Forces are employing these weapons in Iraq, frequently as "door-busters", according to after-action reports received. The weapon is now designated the M1014.



Operation: Desert Storm

Project: Lightweight Chemical/Biological Protective Garment

Country: United Kingdom

Manufacturer: J. Compton Sons and Webb, Ltd.

Description: Marine infantry units deployed to Operation Desert Storm in 1991 with the British MK-V chem-bio protective garments which were, at the time, undergoing a lengthy evaluation by the Army under the FCT Program. An urgent procurement was authorized so each Marine would have at least in his backpack effective self-protection against expected chemical and/or biological warfare attacks in Kuwait and Iraq.



Operations: Enduring Freedom, Iraqi Freedom
Project: Mine-Protected Clearance Vehicle, “Buffalo”
Country: Republic of South Africa
Manufacturer: Denel Mechem, partnered with Technical Solutions Group (U.S.)

Description: After successful FCT qualification in 2002, the first two Buffalo production units were deployed to Afghanistan in support of another deployed FCT success, the Interim Vehicle-Mounted Magnetic Mine Detection (IVMMD) System. The vehicles are currently in operation in Iraq with the 612th Engineer Battalion. U.S. units also have 2 RG-31 vehicles (command cars for the IVMMD) deployed in Afghanistan and Iraq.



Operations: Enduring Freedom, Iraqi Freedom
Project: Next Generation 25K Small Loaders (Halvorsen Loaders)
Country: Australia
Manufacturer: Static Engineering, partnered with FMC Corporation (U.S.)
Description: Halvorsen loaders are now the standard 25,000 pound loaders for the Air Force and have been deployed with Air Force airlift units in Afghanistan and Iraq since the beginning of Operation Enduring Freedom. Introduction of the Australian advanced loader resulted from FCT evaluation of two foreign loaders in competition to meet Air Force requirements to replace the aging, unreliable loaders in the inventory.



Operations: Desert Shield, Desert Storm
Project: Self-Propelled Acoustic-Magnetic Minesweeper
Country/Mfr: Sweden
Manufacturer: Karlskronavarvet
Description: The Self-Propelled Acoustic-Magnetic Minesweeper, then under evaluation in the FCT Program, was deployed on an urgent basis and used by U.S. Naval Forces during and after Operations Desert Shield and Desert Storm in 1990/1991 to conduct remote minesweeping in shallow water, searching for and clearing enemy naval mines.



Operations: Enduring Freedom, Iraqi Freedom
Project: Standard Advanced Dewar Assembly-Type II, and One Watt Linear Drive Coolers
Country: France, Germany
Manufacturer: SOFRADIR, AEG Infrarot Modules
Description: With the deployment of the 1st Cavalry Division and the 4th Infantry Division to the Middle East, Abrams Tanks and Bradley Infantry Fighting Vehicles were inserted into the theater of operations in support of Enduring Freedom and Iraqi Freedom with an unrivaled day/night, all-weather capability to engage targets and provide situational awareness. This capability is provided by the advanced 2nd Generation FLIR systems in the platforms' sights, which have SADAs developed by SOFRADIR of France and One Watt Linear Drive Coolers developed by AEG Infrarot Modules of Germany, both successfully qualified for procurement by the Army's Horizontal Technology Insertion (HTI) Program, Night Vision and Electronics Sensors Directorate at Fort Belvoir, Virginia.



Operations: TWA 800 Crash Recovery (1997), Pennsylvania Mine Rescue (2002)
Project: Transportable Recompression Chamber
Country: Australia
Manufacturer: Cowan

Description: The MK 6 Transportable Recompression Chamber provides the ability to provide immediate on-site treatment of decompression sickness. Navy Underwater Construction Team Two supported deep-water recovery operations after the explosion and crash of TWA flight 800 in the Atlantic off Long Island, New York in 1997. During the operation, the recompression chamber was successfully used to treat an injured diver under emergency conditions. In July 2002, nine units were deployed to the drilling site in Somerset, Pennsylvania, as part of the operation to rescue the coal miners trapped underground at the Black Wolf Mine. *Joseph Sbaffoni, division chief of Pennsylvania's Bureau of Deep Mine Safety said, "The miners were breathing air as if they were diving in 40 feet of water. A sudden arrival at sea-level air pressure would have given them the bends."*



Operation: Bosnia, Iraqi Freedom
Project: Wide Area Uncooled Thermal Imager
Country: Sweden
Manufacturer: Agema Infrared Systems, teamed with Northrop Grumman
Description: The Swedish thermal imagers were used extensively by security forces in Bosnia for protection of fixed installations. They are also currently deployed world-wide, including as operations support in Iraq as a key base-security element of the Air Force's Tactical Automated Security System.



EXAMPLES OF IMPROVED OPERATIONAL CAPABILITIES RESULTING FROM THE FCT PROGRAM

7.62mm Short Range Training Ammunition. The 7.62mm training cartridge developed by *SNC Technologies of Canada* is designed for use on ranges where bullets traveling beyond standard target distances pose safety problems. The Canadian round can be used safely with no damage to training sites. This ammunition has enhanced live-fire training for small unit tactics at military operation urbanized terrain sites and small arms range areas worldwide that are being reduced in size.



Airtronic Light Oil Burner for USMC Tray Ration Heating System. The TRHS is a portable system that heats tray packs during transport aboard a HMMWV to deliver hot cafeteria-style meals to Marines at multiple field locations. The TRHS uses a patented airtronic burner technology from *Bentone Electro of Luxembourg* and *Babington Enterprises of McLean, Virginia*, to deliver high-efficiency, smokeless, odorless diesel combustion for multi-fuel applications. The burner was qualified for procurement and fielded in 1995 under the FCT Program. The TRHS can feed up to 250 meals at a single site and at least 500 meals during a ration day; however, during expanded feeding operations, one TRHS could feed 1,500 people in one day. The TRHS comes with folding tables, rain cover kit, beverage containers, serving utensils, and other collateral equipment



Atmospheric Diving Suit (NewtSuit). The Navy's ADS2000, developed by *Ocean Works International Corporation*, (formerly *International Hardsuit, Inc.*) of Vancouver, British Columbia, is a key unit of the Navy's Submarine Rescue, Diving, and Recompression System. The interior of the ADS 2000 remains at one atmosphere, allowing the pilot to operate at depths of 2000 feet (salt water). Qualified by the Navy through FCT tests at Naval Surface Warfare Center, Carderock, Maryland, and Navy Experimental Diving Unit, Panama City, Florida, the first ADS unit was delivered to the Navy in 1998.



Digital Flight Control System for F-14 Tomcat. Manufactured by then-*GEC Marconi of the United Kingdom*, this system solved the Navy's number one flight safety issue for the F-14 aircraft. The Navy had lost 35 F-14 aircraft due to unrecoverable flat spins. Since the FCT procurement, no aircraft have been lost due to flat spins.



Emergency Evacuation Hyperbaric Stretcher. Developed by *SOS, Ltd., of the United Kingdom*, portable, collapsible chambers are used to transport diving personnel suffering from decompression sickness or gas embolism to a recompression treatment chamber. Initial "Hyperlite" units were fielded to the Navy's Deep Submergence Unit in San Diego, California, and Mobile Diving and Salvage Unit One in Pearl Harbor, Hawaii, significantly improving Navy diving capabilities. When fully integrated into the Navy's Submarine Rescue Diving and Recompression System, it will be a key addition to submarine rescue operations. The Air Force also tested these units under Navy lead and initially deployed one unit to Johnson Atoll in the Pacific for an emergency and to Brooks AFB, Texas, for operational aero-medical use.



Modern Generator Sets for Army Mobile Electric Power. Qualification under the FCT Program, type-classification by the Army, and fielding of the 2KW Generator Sets manufactured by *Mechron Energy of Canada*, marked a historic milestone by eliminating age-old Army dependence on gasoline. The warfighter will now use JP-8 fuel in the field, an inherently safer fuel common across the Army vehicle fleet.



Multi-Role Anti-armor, Anti-personnel Weapon System and Family of Upgraded Ammunition.

Manufactured by *Saab Bofors Dynamics of Sweden*, the Carl Gustaf M3 84mm “MAAWS” Weapon System is a versatile, portable, and lethal shoulder launched weapon system that fires a large suite of ammunition. The weapon is in use by the Army 75th Ranger Regiment, Special Forces SEAL Teams, and other U.S. forces as a result of FCT qualification. Upgraded MAAWS ammunition from Saab Bofors Dynamics, including HEAT, HEDP, HE, Smoke, Illumination, and ADM (Area Deterrent Munitions), conforming to U.S. insensitive munitions requirements, completed testing under the FCT Program and is fielded, significantly expanding the weapon’s capabilities.



APPENDIX D

BENEFITS OF THE FCT PROGRAM

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REDUCED ACQUISITION COSTS AND ACCELERATED FIELDING

The successful use of a non-developmental approach to acquisition reduces new-start development costs. The gap between identifying a requirement and putting the needed equipment in the hands of our operational forces is also reduced in many cases. Table D1 shows examples of estimated development cost avoidance and accelerated fielding times as a result of successful FCT projects since 1980. Estimated production cost savings and reduced life cycle costs are also noted, where applicable.

Table D1. Examples of Development Cost Avoidance¹⁰

FCT Project and Sponsor	RDT&E Cost Avoidance (\$M)	Production Cost Savings (\$M)	Life-Cycle Cost Savings (\$M)	Estimated Development Time Savings
2Kw Gen Sets for Mobile Electric Power – Army	2	33	25	2 years
5.56mm Lightweight Machine Gun – USSOCOM	6			-
7.62mm Lightweight Machine Gun – USSOCOM	6	1		
30mm APFSDS Tracer Rounds for EFV – USMC	>20			-
105mm Lightweight Howitzer M119 – Army	167			-
Airtronic Light Oil Burner – USMC	13			4-8 years
Anti-Riot Grenades L96/L97 – Army and USMC	12			2 years
Automatic Chemical Agent Detector Alarm – Army	279	64		4 years
Digital Flight Control System for F-14 – Navy	122		50-150	5 years
Eagle Vision Sensor Upgrades (SPOT5) – Air Force	30	5	5	
Emergency Aircraft Arresting System – Air Force	10	9	6	4 years
F-15 Countermeasures Dispenser (BOL) – Air Force	50			
Fox NBC Reconnaissance System – Army	750		100	14 years
High Mobility Engineer Excavator – Army	5			-
High Pressure Pure Air Generator (AV-8, UH-1, F/A-18E/F) – Navy	4	24	50	-
Improved Chemical Agent Monitor – Army	2	4		6 years
Joint Protective Aircrew Ensemble – Navy	8			-
Joint RAAWS Ammunition Upgrade I – HEAT, TPT – USSOCOM	20	\$1,800 per HEAT round	1.0 – training costs, TPT	
Joint RAAWS Ammunition Upgrade II - HEDP, HE, ADM – USSOCOM	30	\$300-\$500 per round		
Less than 3Kw Generator Sets – Army	2	33	25	2 years
MC130H Aerial Refueling Pod – USSOCOM	40			1 year
Mine Protected Clearance Vehicle – Army	32	2	50K per year	-
Improved Mobile Subscriber UHF Radios – Army	6			2 years
NBC Analysis System for JWARN – USMC	8			3 years
Next Generation Small Loader – Air Force	12			2 years
Parachute Leaflet Delivery System – USSOCOM	20			
Passenger Anti-Exposure Survival Suits – Navy	2	12 over 10 yrs	30-50% less	-
Prophet Ground (Tactical-Based SIGINT) – Army	10			
Submarine Escape & Immersion Equipment – Navy	9			-

¹⁰ Amounts in then-year dollar estimates.

INDUSTRIAL TEAMING AND PRODUCTION IN THE U.S.

The FCT Program is frequently a catalyst for teaming or other business relationships between foreign and U.S. industries. Many successful FCT projects also result in arrangements for the production in the U.S. of the qualified foreign equipment or technology. Our allies and coalition partners recognize the long-term value of such practices for competing in the U.S. defense market and the resultant strengthening of the “two-way street” in defense procurement. For the U.S., the result often means the creation of jobs and contributions to local economies.

5.56mm Lightweight Machine Gun. The MK46 Mod0 gun was originally designed and produced by *FN Herstal* located in Belgium. The latest production of the weapon has been transitioned to *Fabrique Nationale Manufacturing, Inc.* in Columbia, South Carolina.

40mm Practice Cartridge (M281 Mod 0). *Nico Pyrotechnik of Germany* is partnered with *American Ordnance of Milan, Tennessee* for the production and delivery of 40mm practice ammunition as a result of a successful FY 1998 Marine Corps project.

155mm Ammunition and 105mm Pre -Formed Fragments. *Denel-Naschem of the Republic of South Africa* is partnered with *General Dynamics Ordnance and Tactical Systems of St. Petersburg, Florida*, for these two ongoing Army FCT projects.

Airtronic Light Oil Burner for Tray Ration Heating System. *Babington Enterprises Inc. of McLean, Virginia*, produces the U.S. Marine Corps’ Tray Ration Heating System. *Electrolux Luxembourg, a subsidiary of Electrolux Sweden*, is licensed to manufacture and assemble the system’s burner and produces it for Babington.

Anti-Riot Grenade. *Pains-Wessex (now PW Defence) of the United Kingdom* formed a partnership with *New England Ordnance of Guild, New Hampshire*, for U.S. production of the L96/L97 grenades for the Army’s Light Vehicle Obscurant Smoke System (LVOSS).

Automatic Chemical Agent Detector Alarm (ACADA) and ACADA Power Supply. *Graseby Dynamics (now Smith’s Detection) of the United Kingdom* and *ETG of Towson, Maryland*, teamed to produce and support early delivery of the ACADA and ACADA Power Supplies to the Army, Navy, Air Force, Marines, and National Guard.

BOL Chaff Dispenser and F-15 Countermeasures Dispenser (BOL). The Swedish and United Kingdom manufacturers of the BOL dispenser and BOL chaff, *Saab Tech* and *Chemring*, respectively, teamed with *BAE Systems North America* (formerly TRACOR) in Austin, Texas. Alloy Surfaces of Chester Township, Pennsylvania, a subsidiary of the Chemring Group, is producing expendables for the systems.

E-2C Multifunction Display Control Unit. *Marconi of Canada* teamed with the U.S. E-2C aircraft manufacturer *Northrup Grumman of Bethpage, New York*, on the CMA 882 Avionics Management System Program.

EHF Traveling Wave Tubes. As a result of the successful FCT testing of its product in 1988, *Siemens of Germany* teamed with the *Raytheon Corporation of Lexington, Massachusetts*, on the Navy’s EHF submarine communications program.

Electronic Combat Integrated Pylon System. *Per Udsen*, the Danish manufacturer of the Electronic Combat Integrated Pylon System, teamed with *Northrop Grumman of Rolling Meadows, Illinois*, and *Lockheed Martin of Fort Worth, Texas*.

Forward Area Degaussing Range. *Raytheon Naval Systems (formerly Alliant Tech) of Mukilteo, Washington*, provided the acoustic portion of the United Kingdom's Forward Area Combined Degaussing and Acoustic Range.

GIANT Infrared Decoy Rounds. *Buck of Germany*, the developer of the "GIANT" Infrared Decoy Rounds used in the Navy's Super Rapid Blooming Offboard Chaff (SRBOC) shipboard countermeasures launchers, teamed with *Sippican Inc., of Marion, Massachusetts*, for the refurbishment of GIANT rounds in the U.S. inventory to increase their operational shelf life.

Heavy Assault Bridge, Leguan. The Army selected the German MAN bridging system in 1994 for Engineering and Manufacturing Development (EMD). MAN teamed with *General Dynamics Land Systems of Sterling Heights, Michigan*, for the successful FCT evaluation. The system was approved for Low Rate Initial Production in FY 1998 and dubbed the "Wolverine."

High Mobility Engineer Excavator. *Australian Defence Industries* teamed with *Oshkosh Truck Corporation, Wisconsin*, for this successful FCT evaluation sponsored by the Army. The vehicles are being produced in Wisconsin.

Improved Mobile Subscriber Equipment UHF Radios. *Canadian Marconi* partnered with *General Dynamics Communications of Taunton, Maryland*, for the phase 1 production of these radios as a result of a successful Army project managed by the Communications-Electronics Command, Fort Monmouth, New Jersey.

Joint Protective Aircrew Ensemble. *Creative Apparel Associates of Belmont, Maine*, was awarded a delivery order contract in FY 2002 to manufacture protective garments for System Development and Demonstration (SDD), including Low-Rate Initial Production amounts, using materials provided by *Blucher GmbH with Theodolf Fritzsche GmbH of Germany*, which were qualified for procurement in this successful FCT project.

Laser Marksmanship Training System "Hummerbook". *Seoul Standard of the Republic of Korea* is teamed with *Beamhit, Inc., of Columbia, Maryland* for this ongoing Army FCT project.

Lightweight Antitank Weapon M72A5. *Talley Defense, Mesa, Arizona*, led the consortium that includes Raufoss as an original equipment manufacturer, along with *BAE Systems North America (formerly TRACOR) of Austin, Texas*, to produce M72A5 weapons for U.S. Forces.

Lightweight Smoke Generator. *PZL Rzeszow of Poland* is teamed with *Unitronics Corporation of Saint Charles, Illinois*, for this ongoing Army FCT project.

Man-Portable Multi-Sensor System Headsets and Sensors. *Nextlink of Denmark* and *Source of Sound of Israel* are providing headsets for the U.S. Special Operations Command Integrated Communications Helmet in association with *Television Associates of Brewster, New York*, as a result of a successful FY2001 project conducted by U.S. Special Forces.

Mine Protected Clearance Vehicle. *Denel Mechem of the Republic of South Africa* teamed with *Technical Solutions Group of Charleston, South Carolina*, for the successful FCT evaluation sponsored by the Army. The first vehicles are manufactured in Charleston.

Muzzle Velocity System. The Israeli Reshef contract was awarded to *RSL Electronics USA, Inc. of Poughkeepsie, New York*. *Technical Systems Inc. in Grand Rapids, Michigan*, is producing the muzzle velocity system for the Army.

Naval Active Intercept and Collision Avoidance. *Sonartech of Australia* is teamed with the undersea warfare technology company, *Mikel, Inc., of Fall River, Massachusetts* for this ongoing Navy FCT project.

Next Generation Small Loader. *FMC Corporation of Orlando, Florida*, teamed with *Static Engineering of Australia* and won the competition in this successful FCT project for the Air Force.

Powered Multifuel Burner. *International Thermal Research, Inc. of British Columbia, Canada*, teamed with *Tech Research Group in Providence, Rhode Island*, to submit their candidate for a successful FCT evaluation in meeting this Army and Marine Corps requirement.

Regenerative Drive System. *Permo-Drive of Australia* is teamed with *Dana Fluid Systems of Toledo, Ohio*, for this ongoing Army FCT project.

Renaissance View Satellite Data and Eagle Vision. *Northrop Grumman (ERIM International) of Ann Arbor, Michigan*, and *Matra CAP Systems (now EADS), Velizy, France*, teamed on the initial imagery project, while *IOSAT Corporation of Halifax, Nova Scotia, Canada*, joined for the upgrade to the Eagle Vision Satellite Imagery Receiving and Processing Station.

Replacement Structures for Aircraft. *PZL Swidnik of Poland* is teamed with *Alcore of Edgewood, Maryland*, for this ongoing Navy FCT project.

Skin and Open Wound Decontamination. *O'Dell Engineering of Canada* teamed with *Curtiss Laboratories of Ben Salem, Pennsylvania*, and *Leominster, Massachusetts*, and *E-Z-Em, Inc., of Long Island, New York*, for the evaluation and potential production of its Reactive Skin Decontamination Lotion for use on skin, open wounds, and equipment. The project was sponsored by the Marine Corps.

Underwater Communications and Tracking System for Submarines. *Nautronix of Australia* is teamed with *Lockheed Martin of Manassas, Virginia* for this ongoing Navy FCT project.

Ultra Lightweight Camouflage Net System. *Diab-Barracuda of Sweden*, now part of *Saab*, is supplying machinery, equipment, and technical assistance to *BAE Systems North America (formerly TRACOR Aerospace) of Lillington, North Carolina*, to manufacture the camouflage net system to meet Army requirements.

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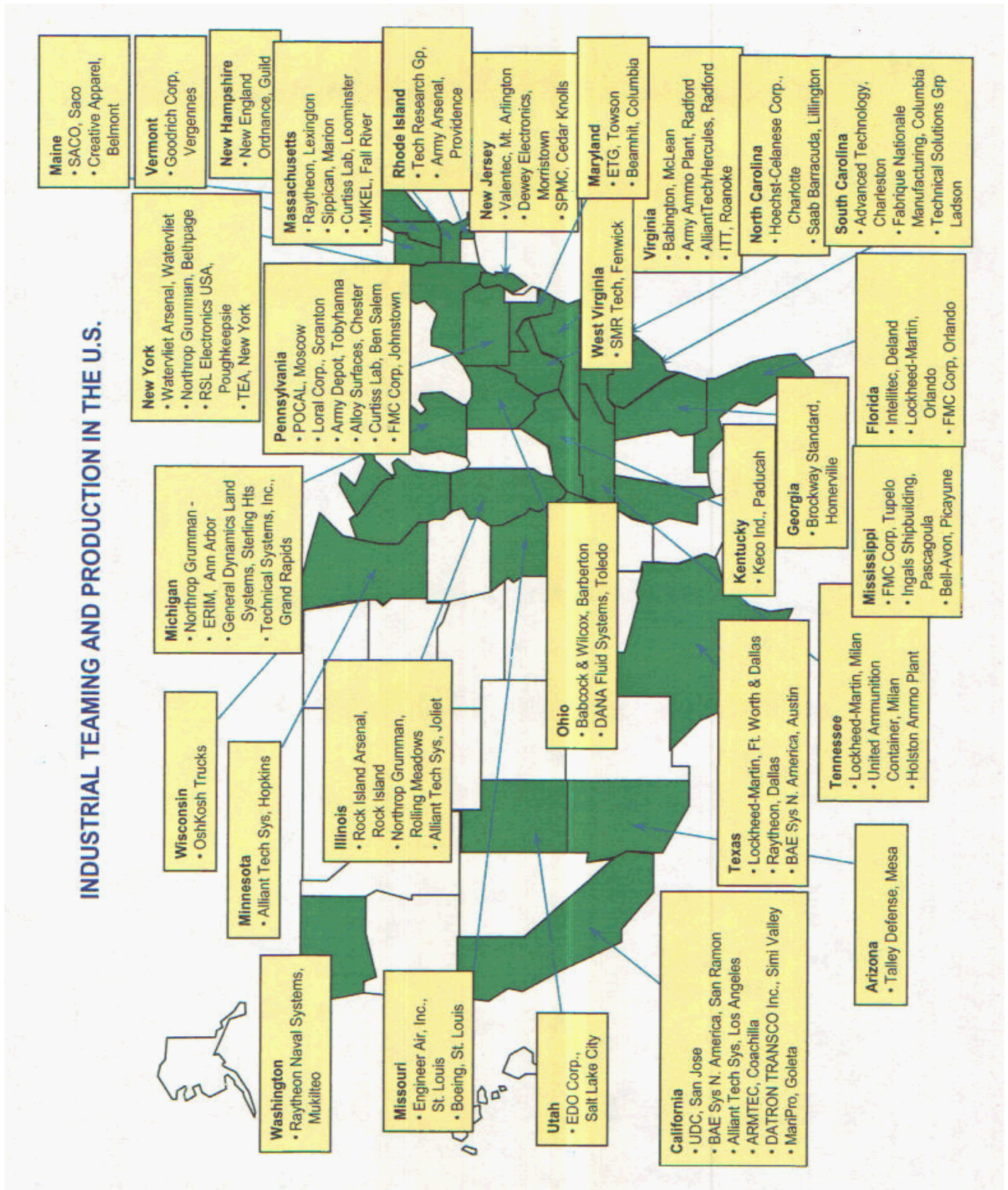


Figure D-2. Industrial Teaming and Production in the U.S.

FCT TESTING & PROJECT MANAGEMENT LOCATIONS IN THE U.S.

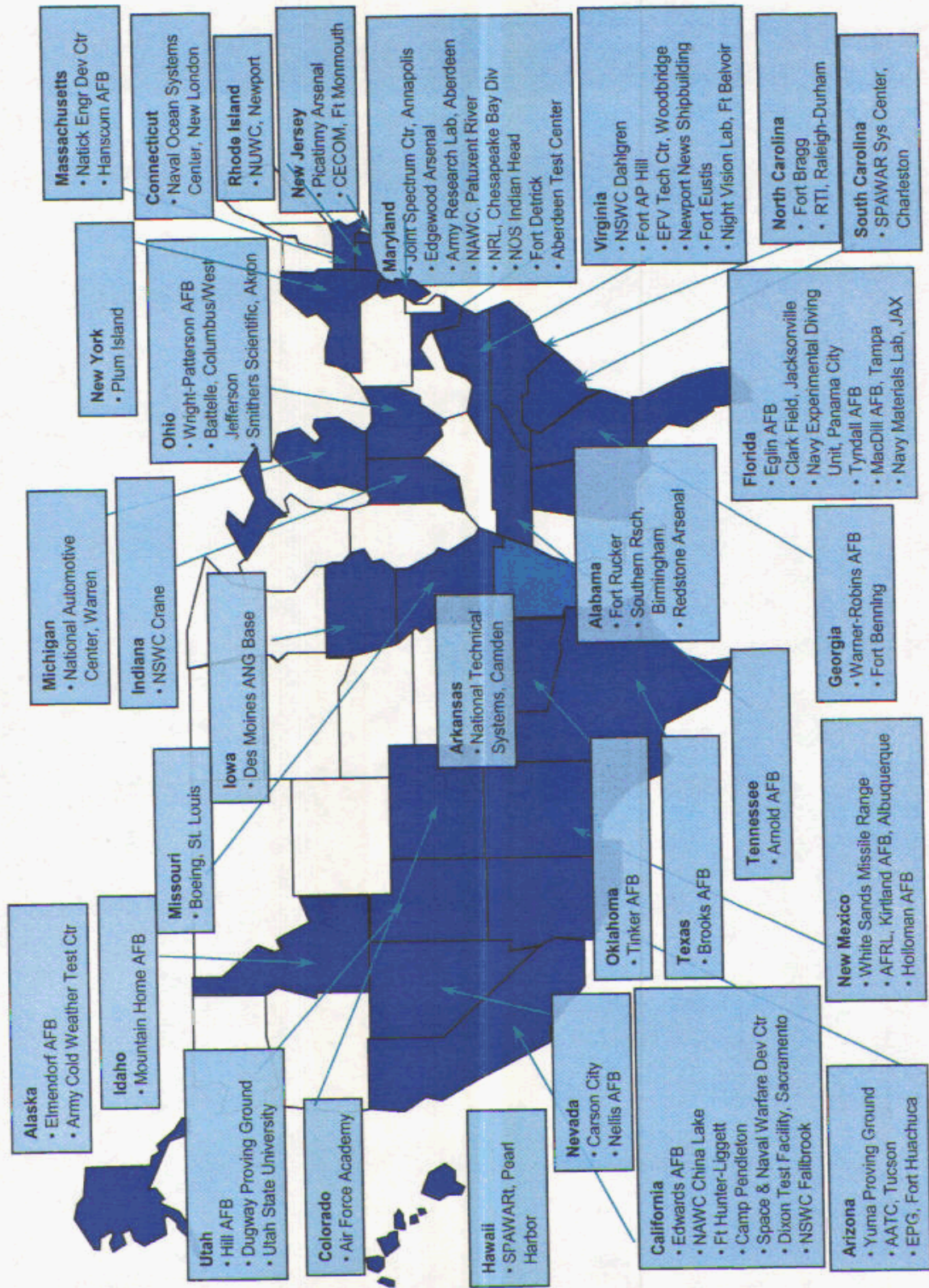


Figure D3. FCT Testing and Project Management Locations in the U.S.